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Health in the Nursery

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THE DISEASES OF CHILDREN, MEDICAL AND SURGICAL. By HENRY ASHBY, M.D. F.R.C.P. Physician to the Manchester Children's Hospital, and Lecturer and Examiner in Diseases of Children in the Victoria University; and G. A. WRIGHT, B.A. M.B. Oxon. F.R.C.S. Eng. Assistant Surgeon to the Manchester Royal Infirmary and Surgeon to the Children's Hospital; formerly Examiner in Surgery in the University of Oxford.

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Health in the Nursery

BY

HENRY ASHBY, M.D., F.R.C.P.

PHYSICIAN TO THE MANCHESTER CHILDREN'S HOSPITAL AND
LECTURER ON THE DISEASES OF CHILDREN AT THE OWENS COLLEGE

'No change in childhood's early day,
No storm that raged, no thought that ran,
But leaves its track upon the day
Which slowly hardens into man'

ROMANES

FOURTH EDITION

LONGMANS, GREEN, AND CO.
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PREFACE

TO

THE FIRST EDITION

PERHAPS it is hardly necessary to say that this book is in no sense a 'dictionary of domestic medicine,' and that everything connected with the treatment of serious disease in childhood lies entirely outside its scope.

Its aim is rather the prevention of disease, by setting forth the conditions conducive to healthy life during early childhood, and by helping to clear away some of those ignorant customs and prejudices prevailing in the nursery which have become 'sacred through long descent.'

In the chapters on the mental development of the infant I have endeavoured to interest parents in watching the gradual growth of intelligence in the child, believing that the knowledge thus gained cannot fail to be of the greatest use in studying dispositions and tendencies, and in directing education and training.

I must express my great indebtedness to the writings of Preyer, Romanes, Sully, and Baldwin for

inspiration and help in the study of Child Psychology, and to two ladies, Mrs. Moore and Miss Shinn, for their valuable observations on children.

I am much indebted also to my friend, Dr. E. M. Brockbank, for his kindness in reading the manuscript and correcting proof-sheets; and to Dr. A. Mumford and Mr. George Comber for their kind interest and help.

H. A.

MANCHESTER: *September* 1898.

PREFACE TO THE THIRD EDITION

IN preparing a Third Edition, a new chapter on 'Growth and Development during Early Life' has been added, as well as other new matter; the text has been carefully revised.

H. A.

MANCHESTER: *March* 1902.

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HEALTH IN THE NURSERY

CHAPTER I

TRAINING IN THE NURSERY

'THE greatest defect,' says Preyer, 'in our European education at the close of the nineteenth century consists in this: that in the first period of the life of the young there is far too little physiological training, and at a later period far too much unphysiological instruction.'[1]

Every infant comes into the world with a goodly number of instinctive tendencies or dispositions, which are derived from its parents, and which have been handed down from generation to generation. These tendencies do not show themselves at birth; they must await the development of the mental powers and the system generally. For ages past man has walked and talked, and the infant born to-day tends to repeat what its ancestors have done, and, when development is sufficiently advanced, learns to walk, and a few months later begins to express itself in articulate speech.

[1] *The Infant Mind*, p. 40.

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Among these hereditary tendencies, which are early in evidence, are the tendencies to the formation of habits which are necessary for the infant's comfort and well-being, but these must be fostered and encouraged under the influence of the nurse and parents, if they are to be formed aright.

While the infant inherits much which makes for the right direction, there can be little doubt that early in life it shows tendencies which have been derived from our savage and uncivilised forefathers. It must be said, alas! that it is destitute of any sort of conscience, its pleasures are those of its appetite, it has a short and sharp temper, and will bite and 'butt' when its angry passions are aroused. As Sully puts it, 'Ages of civilisation have not succeeded in eradicating some of the most characteristic and unpleasant impulses of the brute.' [1]

In addition to the inherited tendencies which are common to all civilised races, the infant succeeds to various family virtues and failings, just as it also shows a family likeness in its face and configuration.

It has been said that 'Nature is stronger than nurture,' and strong hereditary tendencies often appear to defy the most persistent care and training; but who can doubt that education in the broadest sense, and the influence of refined caretakers, powerfully stimulate the healthy tendencies and efficiently hold in check the evil ones?

Fortunately, very early in the infant's career it is influenced very materially by its surroundings, and is capable of much physiological training. The nurse, for instance, learns to put it to sleep by some

[1] *Children's Ways*, p. 114.

mysterious influence which she obtains over it, succeeding when others fail. The infant becomes accustomed to her personality ; there is something in her manner, her touch, her voice which soothes it off to sleep, and this is the more curious as it occurs at a period before the infant is able to recognise the face of the nurse or distinguish her from a stranger.

Baldwin relates how the nurse of his own infant when only a month old, used to put the infant to sleep by laying her face downwards, gently patting her back, and singing nursery rhymes. When she was four months old Baldwin himself undertook the duties of nurse, and found at first great difficulty in getting the child off to sleep, though closely following the nurse's methods ; gradually, however, he succeeded, so that later he was able to get her off to sleep in four to ten minutes, even under the most difficult circumstances, as when she was suffering from the discomforts of teething.[1] This instance at least serves to illustrate the influence exerted by a nurse which a stranger cannot accomplish at first.

The formation of habits by means of association or suggestion is worth an attentive study. An infant is put into its cot, the room is darkened, the nurse pats it gently and sings a monotonous nursery rhyme, and it gradually drops off to sleep. After frequent repetition, these circumstances suggest a drowsy state, and the habit is formed of going off to sleep when the room is darkened and the song begins. This habit of going off quickly to sleep when put to bed is a very valuable one, and worth some trouble and pains to bring about.

[1] *Mental Development in the Child and the Race*, p. 115.

In the same way the habit of emptying the bladder, &c., when held out, is gradually formed by frequent repetition of the holding-out position. If the nurse will hold the infant out at intervals of a few hours during the day and night, especially after being fed, if not at first, certainly before long, the position assumed will by 'suggestion' bring about the emptying of the bladder and bowels. In a few months the habit is formed by the infant of controlling its functions during the intervals, and waiting till the time comes round for being held out. Of course accidental wettings will occur during times of ill-health, but the accidents need not be frequent. A few months later the associations become wider, as the child when held out or seated makes grunting sounds, and this the child imitates, and makes a sort of '*kah, kah*' or '*err, err*' sound when it wishes to inform the nurse that its wants require attending to or that an accident has occurred.

It is unnecessary to point out what a gain there is in comfort and health to the infant if the nurse succeeds in training it properly in this matter. The difference between a careful nurse and an indifferent one comes out strongly in apparently trifling attentions of this sort. Bad habits are as easily acquired as good, and if the infant is used to warm and dry napkins, it will be uncomfortable and whimper when the napkin is fouled; but if its wants are disregarded, and it frequently lies in wetted things, it will get used to the discomfort, and will no longer fret and cry when its clothes are damp and foul.

Very early in life the traces of the brute begin to be in evidence in the shape of rebellion against

established authority and in the display of a decided shortness and sharpness of temper. The first evidence of temper shows itself, perhaps in connection with the milk supply. The infant wakes too soon, before feeding time has come, or the bottle is not warmed up quickly enough, or its contents have disappeared without satisfying the appetite, and forthwith the storm bursts. Or it may be the infant declines to be put into his cot in order to go off to sleep, but wants to be taken in the nurse's arms to be walked about, and cries and roars tempestuously until she takes it up. The 'comfort'—precious thing—is on the floor, or among the bed-clothes, and there is no peace until it is found and once more in the mouth.

A little later, when the baby has tasted the joy of handling toys, it is jealous over its possessions, and expresses itself in strong and forcible language if any one is daring enough to dispute its rights.

While it cannot be expected that these trials will be borne with equanimity, there cannot be a doubt that with many babies there is a great deal of unnecessary crying about small matters, which a little resolution and tact on the part of the nurse would prevent. Nurse wants to set the nursery tidy or busy herself in various ways; the baby will not sleep and does not want to be left to amuse itself; it expects to be taken up and walked about, and because it does not get its way there is an uproar. It throws itself back, stiffens its limbs, and cries loud and long. The nurse, or perhaps the mother, cannot endure its cries, and thinking that it will do itself some mortal injury, lets it have its own way, and it learns the lesson

it is not slow to learn, that it has only to cry loud enough and long enough to get all it wants.

Likely enough the nurse, good soul, becomes extremely attached to her boy, and will endure any number of wakeful nights and spare no pains to make him happy. She will make a show of resistance at times, and spasmodic efforts to win authority ; but she lacks persistence, and her baby treats her with the contumely and contempt born of indulgence, and he has only to show enough impatience and temper to bring her to a sense of her iniquity, and once more she comes off second best. As time goes on he reads her face at a glance, and on any sign of weakness is more than imperious in his demands. If she thwarts him for a moment he administers a mimic chastisement with his hands ; he even uses his teeth in his rage, till the nurse is heart-rending in her entreaties and promises.

If medicine has to be taken, he refuses point blank, and entreaty, bribes and threats are alike unavailing ; or if sickness overtakes the child, and a doctor arrives, he will be more than human if he can be of much service.

Who has not pitied a hospital nurse sent to look after a spoiled child during sickness, and has had to manage as well a foolish and interfering mother ? And yet how much she can accomplish, when the child has found out for the first time in its life that it is not the only individual in the universe, and that the world was not made for its especial amusement.

Nothing is more striking than the difference in the behaviour of babies, as far as tempers and crying are concerned, between the first day or two after admission

to a hospital ward and what it is later. During the first day or two there is much crying when they are left alone in the cots, as they expect to be nursed and carried about all day as they have been at home ; however, they quickly find that crying is useless, and they fall into line with the others, and lie quiet and contented in their cots.

In the training of infants and children the personality of the nurse counts for much ; what is wanted is tact, firmness and consistency. The nurse does infinite harm who first indulges the child, and then when the child takes advantage of her folly she loses her temper, speaks roughly, shakes or frightens it into quietness.

> Who overcomes
> By force, hath overcome but half his foe.

The wise nurse will divert the infant's attention by substituting some attraction in the way of a toy, a song, &c., in the hope of making it forget its trouble. How often tears can be turned into laughter every good nurse knows. When furious and long-continued tempers come on, administer a little wholesome neglect—too much sympathy is the worst means of teaching self-control. Leave them alone in some safe place on a bed or on the floor, let them find out that they hurt no one but themselves, and make friends again at the earliest possible moment.

During the infant's waking hours there are only two places for it. It should either be in the nursery or in the open air. In the dining or drawing-room it is out of place. In the drawing-room at 'showing off times' it sees new faces and is taken from one

to another, it is jumped about and romped with, and if old enough is rolled over and over on the floor and made to laugh uproariously, and all this as a preparation for its supper and bed. Clever and forward children are especially apt to suffer in this way. Let us remember that the world is new to the baby, that everything is strange, that the infant's brain is unstable, that excitement is poison and inimical to steady progress.

The principle of diverting the attention of the infant in order to get it to cease crying is of value for this purpose, even before the infant can understand anything that is said to it, or before it has learnt to control its actions. It is a first stage in teaching self-control.

Every nursery could provide daily many instances of finding counter attractions for an infant to draw away its attention from its angry self, and so cause inhibition or cessation of the tempers or weeping. I will copy a few instances as illustrations from Mrs. Moore's careful record of her baby.[1]

'*Third day.*—He frequently started at loud noises and ceased crying.

'*Twenty-fourth day.*—The striking of a clock caused him to stop crying.

'*Thirty-eighth day.*—The voice of his father caused him to stop crying.

'*Forty-first day.*—Interesting sights diverted the child's mind from personal discomforts great enough to cause crying.

'*Fifty-fifth day.*—The child, who had been held more than usual during the second month, cried, on

[1] *The Mental Development of a Child*, p. 32.

the fifty-fifth day, when laid down. When no one responded he ceased crying and became pleasant.

'*Tenth week.*—Inhibition of crying was of frequent occurrence; the child often stopped with his face made up for a cry, the cry being lost in the active contemplation of some interesting performance.

'*Twenty-eighth week.*—For two days in succession the child, who had before been held at the table during meals, cried, and was taken to the dinner-table. The third time he cried this was not done; but he was permitted to cry until of his own accord he stopped. After this he did not cry again upon seeing others go to the table.'

When three or four months old the infant begins to read its nurse's face and to notice the different tones of her voice, it can tell in a moment whether she is pleased or displeased, or amused, and it quickly begins to associate the nurse's mood with its own doings. As it gets older it gets some notion of right and wrong, good behaviour and bad behaviour, or, in other words, 'Good is what is allowed, bad is what is forbidden.' The wise nurse or mother will maintain a uniform standard; what is good one day cannot be wrong the next, what is allowed to-day must not be forbidden to-morrow if a good influence is to be exerted.

During the second year, when the infant begins to understand a certain amount of what is said to it, and has gained some experience of what is allowed and what is forbidden, training necessarily becomes more easy. Some advance has been made in learning self-control, but we know how, during the whole of childhood, outbursts of temper or fits of crying take

place which it is not easy to control. The tendency to cry when disappointed or crossed continues for years to be a distinguishing feature of childhood.

The amount of care which has necessarily to be bestowed upon children is apt to become an important factor in directing their attention too much upon themselves. At the time when their self-consciousness is beginning to develop, when they are beginning to recognise their own existence and the amount of attention of which they are the centre, they are apt to get a very exaggerated notion of their own importance. All this becomes morbidly exaggerated if the child has the misfortune to be delicate or to suffer from continued ill-health. Ill-health is a great misfortune during early life, not only on account of its interfering with development, but also on account of the child receiving an inordinate amount of attention and sympathy. Such children are apt to be very much spoilt ; they expect to be considered on every possible occasion and under all circumstances, and they too often learn the art to perfection of obtaining from their parents everything they want.

The ' only child,' who has no associate but adults, who bow down before their idol, is not likely to get a healthy training. There is nothing like a certain amount of roughing it in the nursery, and having child companions to share pleasures and trials, to teach self-restraint and to form character.

While emphasising the importance of training children from the very earliest period by gentle and continuous method, care must be taken not to fall into the opposite extreme to that of indulgence, and, instead of spoiling them, applying a too rigorous

and violent discipline. Every allowance must be made for the waywardness and contrariness of early life.

Above all, let no one play upon the timidity and fears of children in order to exact obedience. The child mind has a sort of instinctive dread of the dark, and with many children the fear of what is to them the supernatural amounts to nothing less than torture. How many children's lives have been rendered miserable through fear of being left in the dark, by ghost stories, by uncanny noises, and the horrors associated with death! Nurses who play upon the fears of children have much to answer for, whether done for their own amusement, or in order to frighten them into obedience.

The child's first knowledge, which is acquired months before it can understand a single word of what is said to it, is the result of its own explorations and experience. It gains its knowledge by means of seeing, touching and tasting the objects upon which it can lay its hands. It sees an object, its attention is aroused, it seizes it, feels it, tastes it. In this way it accumulates a certain store of experience and knowledge of the object world.

Were it not so often forgotten, it would hardly be necessary to say that during the whole of infancy and childhood, teaching, to be of much value, must be by direct sense-perception of the objects themselves. It has been well said: 'Not even the best pictorial illustrations of the things surrounding the child have anything like the educational value of one single object seen and felt by himself. Children who must make the acquaintance with the world through gay picture

books, or through the varying, subjectively coloured speech of adults, cannot get the right notion of it.' [1]

The education which insists on the direct handling of the objects themselves is the wisest and the best. Our domestic animals, birds, flowers, pebbles, the sea-shore, are among the child's first and best teachers. Dolls and lifelike models of animals are better for the infant than gaily coloured picture books. The latter may be well enough when the child has already formed its own ideas from life or the objects themselves. All attempts at teaching the abstract are out of place in early life. Unfortunately, not only ignorant but educated and thoroughly well intentioned people think it necessary, even in early childhood, to attempt to initiate their children in some of those mysteries which are beyond the ken of the wisest and greatest of mankind. Surely it is enough for the child to live in the present, to gradually gain experience of the things which it can see, feel, and understand, to learn 'self-knowledge, self-reverence, self-control,' leaving entirely out of the programme all attempts at grasping matters which, however important, are altogether beyond the limits of its understanding.

The first two or three years of our lives are for the most part blank as far as our memories are concerned. We cannot recall the difficulties we encountered in taking our first steps, or in our early attempts at speech; many faces and scenes with which we were once familiar have long since faded out of mind, and, in consequence, we are apt to think that but little of importance occurred in our lives during these early periods.

[1] Preyer, *loc. cit.* p. 67.

But surely this is not so. I have attempted to emphasise the fact that the infant is profoundly influenced by his environment ; that while hereditary influences may be strong, yet the influence exerted by our earliest associates, though their faces and names may have long since passed into oblivion, must have helped to mould our characters and guide our destinies.

It is just here that the moral comes in. Let me plead for the better education and most careful selection of the British nursemaid. Dare I go further, and suggest that there is some one behind the nursemaid, whose wisdom is not always as supreme as her devotion, but from whom in the near future we shall expect better things ?

Thanks to many influences at work during the last twenty years, the education of both sexes in our schools at the present time is vastly superior to what it has been in the past. Possibly a better influence than is often found in the nursery, a more intelligent supervision of the first few years of life, would render the future teacher's task more easy and his disappointments fewer.

A study of the first few years of life cannot fail to remind us how dependent infancy is upon age. But is there no counterclaim ?

The poet asks :

> Ah me ! What wonder working occult science
> Can from the ashes of our hearts, once more
> The bloom of youth restore ?
> What craft of alchemy can bid defiance
> To time and change, and for a single hour
> Renew the phantom flower ?

May we not answer, that what alchemists through

centuries of disappointment have failed to accomplish, our children can. In them we live again, in them we renew our youth. Contact with their fresh lives freshens the life which is in us. Sympathy with their tiny griefs and disappointments helps us to bear our share of the world's greater sorrows ; sharing their joys and pleasures brightens and lightens our daily work.

CHAPTER II

THE NURSERY AND ITS FURNITURE

As the most important individual in the house is the baby, the most important room is the nursery. No pains should be spared in making nursery-land cheerful, healthy and comfortable, for the younger members of the family have to spend so much of their time there.

Two rooms are usually selected at the top of the house, for the day nursery and the night nursery. Top-storey rooms are quieter than those lower down, and this is an important consideration when the younger children are having their mid-day sleep; at the same time, rooms just below the roof are cold in winter and hot in summer.

In choosing a room for the day nursery the choice will naturally fall on one facing south or west. Aspect is more important than prospect, although a cheerful outlook is not to be despised. Sunlight, however, is of such value in a nursery that it should face the sunny side if it is at all possible. The windows should be large, so as to admit plenty of light, but it must not be forgotten that a large surface of glass means a large cooling surface, and this is a matter of some importance if the windows face the cold quarters.

In furnishing a nursery it is well to bear in mind that sooner or later it will have to be turned out and disinfected after the visitation of some infectious disease such as measles or hooping-cough, so that expensive fittings, pictures, and carpets are quite out of place; it is far better to destroy and to replace than attempt to disinfect.

The walls must have a smooth, non-absorbent surface, and be capable of being well washed down without damage. The best material for the purpose is that recommended by Burdett for cottage hospitals, namely, a layer of Portland cement, painted and varnished. This makes a perfectly hard surface which can be washed down as often as may be necessary. A silicate paint, known by the name of 'Duresco,' answers very well, especially if varnished.

Expense will often stand in the way of painted walls, and in that case one of the excellent sanitary wall-papers with a smooth washable surface may be substituted. Care must be taken to strip the walls of the old paper before applying the new. All papers which are not absolutely arsenic-free should be carefully avoided.

Naturally it will be desired to make the walls of the nursery as attractive as possible by means of pictures, but picture frames catch dust, and certainly their number should be limited. The pictures should be cheap, so that they can be burnt in case disinfection of the nursery is necessary. Coloured pictures from Christmas numbers of the illustrated journals are cheap and attractive. 'Artistic pictures' of animals, 'object lesson pictures,' such as are sold at the Kindergarten toy-shops, are very suitable for this purpose.

A smoothly polished wooden floor makes the most sanitary surface, but it must not be too slippery, as serious accidents have resulted from falls on such surfaces. Linoleum is preferable to carpets, as the surface can readily be washed and swept, and it must be remembered that plenty of *débris* in the shape of food and grease is apt to fall on the nursery floor. There is no objection to a hearthrug in front of the fire-place, as it can be removed when necessary, beaten, and hung out in the open air.

Heating and ventilation.—The nursery should be heated by an efficient fire-grate, which must be large enough to warm the room thoroughly in cold weather; an open fire-grate for burning coal is far preferable to a stove or hot pipes, on account of its promoting ventilation by means of the chimney draught. Teale's grates are very well suited for a nursery. The fire-place must be protected by a fire-guard at least four feet high, so as to prevent accidents. Every nursery should have its thermometer, and should be maintained at a temperature of 60° F. to 65° F. in winter; this is quite warm enough for healthy children. A higher temperature may be necessary for delicate babies. Ventilation may be provided for by having one or more Tobin's tubes with valves to regulate the incoming air. Every day the nursery must be flushed with fresh air, for at least half an hour, by opening the windows wide.

It is well to bear in mind that there usually is a draught of cold air travelling along the floor from the door to the fire-place, and children sitting on the floor will feel this more than adults who are sitting or standing in the room. A screen placed near the

door will help to protect from this draught. A good one for this purpose may be made by attaching a sheet of red Turkey twill by means of tapes to a folding wooden frame like a 'clothes horse,' the lower edge being left free so as to touch the floor.

The night nursery should be a large room capable of being well warmed and ventilated; the temperature need not exceed 60° F. for healthy children. Night nurseries are often too cold at night, and in this way children are prone to catch cold in winter. There should be a fire in winter if there are young children. There is no objection to a gas stove provided with a flue which takes away the products of combustion. No stove without a flue should be allowed on any account, as the fumes from burning gas are not only unhealthy but dangerous.

Cots.—Cradles and swing cots are, to say the least of it, not necessary, and all drapery such as curtains are useless if not injurious. The baby's cot should not be placed in a draught of any sort, so that curtains are superfluous. There is no necessity to rock an infant off to sleep, and the vigorous rocking which infants often get is, I feel sure, injurious. Neither the stomach nor the brain are likely to be benefited by vigorous rocking movements. The 'Hospital Cot,'[1] with an arrangement for lowering one or both sides, is far better than an ordinary swing cot, and can be used for the child for the first four or five years of life. A fixed side rail is very inconvenient for the nurse, who has to bend over the cot to lift the infant in and out and make it comfortable. When the child is nine or ten months old, and is able to sit up for a short time, a board can

[1] *See* Appendix, p. 217.

be fitted across the bed, supported on the side rails where toys can be placed for its amusement when nurse is busy. The cot can be made of wood or enamelled iron ; brass work is much more showy, but a lot of time must be spent on it if it is to be kept brightly polished. The mattress should be of best horse-hair, protected with a rubber sheet, over which is placed an old blanket. The blankets covering the cot should be light and warm ; an eider-down quilt is very warm and snug as well as light in weight.

Toys.—Babies soon want amusing, and toys become important means not only of giving them pleasure, but in assisting in their mental development. The brightly-covered coloured worsted ball suspended within their reach as they lie in their cot, or a jingle of bells, affords them no end of pleasure and amusement. They will follow the ball with their eyes as it swings, and will reach out their hands to get hold of it and set it in motion. All the time they are learning to use their hands, and learning to judge distances, and they are getting an idea of the form and size of objects. Anything that makes a noise is delightful, especially if the baby can assist in the performance. When a spoon can be grasped it is banged against a mug or plate and then down it goes on the floor, and the performance will be repeated as often as the play-fellow cares to continue the game. Then for many months anything in the shape of a toy goes to the mouth, to be tasted as well as felt.

Before long the time-honoured doll comes in for a large share of attention ; it is battered and beaten, or kissed and caressed, according to the ever-varying

mood of its mistress or master, as the case may be. How many generations of children have been attracted by these 'blurred images' of ourselves? Dolls are in fashion the world over, and have held their own for ages past, as testified by their 'remains' found side by side with mummied babies in the catacombs of Thebes.

When the baby can sit up on the floor or to a table the full fruition of the joys of toydom begins. It is not particular as to the quality of the toys; anything will do provided it will make a noise or has some distant resemblance to an animal of some sort. At first the baby's fingers are far too clumsy for building with bricks; besides, this is far too slow a business. It is much more happy in destruction; the knocking down of carefully constructed houses or castles, reared with infinite pains by its older brothers or sisters, is much greater fun.

But the time arrives, however, sooner or later, when bricks, dolls, houses, horses and carts, soldiers, ships, are duly appreciated, and the inhabitants of Noah's ark are arranged in marching order on the hearth-rug. At first all these toys are not assessed at their full value by their owners, and broken limbs and other accidents are sadly frequent. All these toys are the commonplace of every nursery, the daily companions of the children, but I doubt if they are made of as much value as they might be in many nurseries. The value of toys comes in in training the eye and hand, and in attracting the attention. In the selection of toys, those that are the best imitations of nature or art are surely better than others which represent the pantomime or burlesque. Are there

not plenty to choose from without the bogeyish 'Jack-in-the-box,' which has frightened many a timid child?

Too many varieties are showered on the children by well-meaning uncles and aunts. Picture books of the funny or sentimental varieties are highly prized, and he would be a very unsentimental individual who would banish fairy tales or 'Struwwelpeter' from the nursery; but all the same, I have my doubts as to whether the ways of the 'scissor man,' or the history of the youths who emerged 'black as ink' from their forced immersion, are altogether the best sort of stories for a timid child. At any rate, they are more suitable for older children who have learned that there are such things as jokes.

The Kindergarten gifts may be obtained in their order for the child and the various grades of bricks for building, while tablet-laying and drawing-books are welcome resources when weather bound in the nursery.

Bathing.—Infants are usually bathed in the morning and older children at night. One of the reasons for giving the infant a morning bath is that a thorough cleansing is often necessary in consequence of the wetting or the fouling of the napkin during the night, while in older children they get more or less dirty during the day in the course of their play, and they require a bath before being put to bed. In any case an infant should be bathed once a day all over, and the groins and buttocks should be sponged as often as is necessary. Great care must be taken in bathing immature or weakly babies; if there is any blueness about the mouth or lips, or if the extremities turn cold, bathing must be given up and sponging limb by limb resorted to.

The temperature of the infant's bath should be tested with a bath thermometer and not be left to guesswork ; 100° F. is the proper temperature for an infant's bath, and when three months old the temperature of 95° F. is better. A bath too hot is bad, as the infant's skin is very tender. When the bath water is mixed, a degree or two above these figures may be taken so as to allow for cooling.

The temperature of the room in which the bathing operations are conducted is of just as much importance as the temperature of the bath, and colds are often contracted at this time. The nursery should be at least 60° F., and there should be no draughts. The infant must be undressed quickly, laid on the nurse's lap on a double bath blanket and soaped all over with a piece of flannel, especial care being taken to include the fissures between the folds of skin at the groin, armpits, and folds of the neck, for perspiration or secretions are apt to be retained at these places. After soaping the infant is placed in the bath and the soap quickly washed off. A minute or two is quite long enough for a young baby to remain in the water, though the time may be extended as the infant grows older. After the bath the infant is quickly dried with a soft towel.

The skin of a healthy infant needs no powdering, but it must be perfectly dried. Finely-prepared oatmeal or other starch powder may be used if there is any irritation ; the Sanitary Rose powder is also good.

The ordinary tin bath is not very convenient for an infant. It has happened that careless nurses have let the soapy infant slip from their fingers, and an

injury has resulted from its coming in contact with the bath. Baths made of thick rubber are used in America and elsewhere, the bath being supported on a wooden frame. The patent hammock bath is an improvement on the ordinary bath, the infant lying on a stout piece of webbing stretched across from side to side of the bath, and is thus supported while in the water. This form of bath is also of value for giving tepid baths to reduce feverishness, the result of some disease (see fig. 1).



FIG. 1.—Infant's Patent Hammock Bath.

Older children require a warm bath once a day, the most convenient time being the evening at bed-time, so that they can go straight off into bed after the bath. Three or four minutes' immersion will be long enough, and then the child should be enveloped in a rough towel and rubbed dry. A sponging over in the morning with tepid water is a good thing, and if the child has a poor circulation it may stand in warm water during the sponging process.

Weighing machines.—All weighing machines which involve suspending the infant should be avoided,

as such suspension is apt to give rise to much discomfort and struggling. To get the weight correctly, the body of the infant must be in a comfortable position and at rest.

Fig. 2 shows a simple and comparatively inexpensive weighing machine made by Hawksley; it

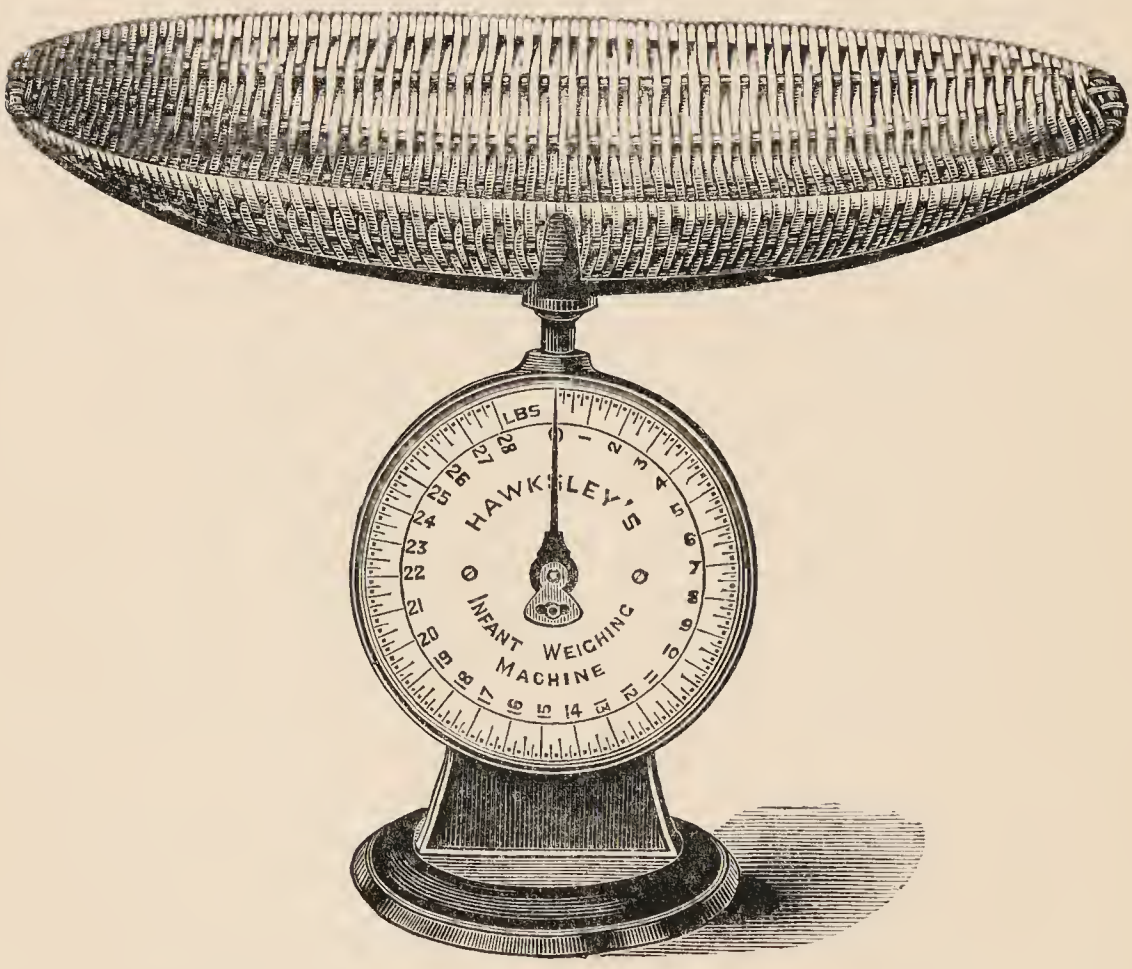


Fig. 2.—Hawksley's Weighing Machine for Infants.

consists of a basket 20 in. by 10 in. surmounting a dial, the pointer of which is capable of indicating up to 28 lbs. by 2 ozs. The infant is wrapped in a shawl of known weight, and when quiet and comfortable the weight is read off.

The Howe Scale Company of New York make

some good weighing machines for the nursery ; one of these weighs 61 lbs. by ½ ozs.[1]

During health weighing once a week or at most twice a week is often enough. It is of interest and of

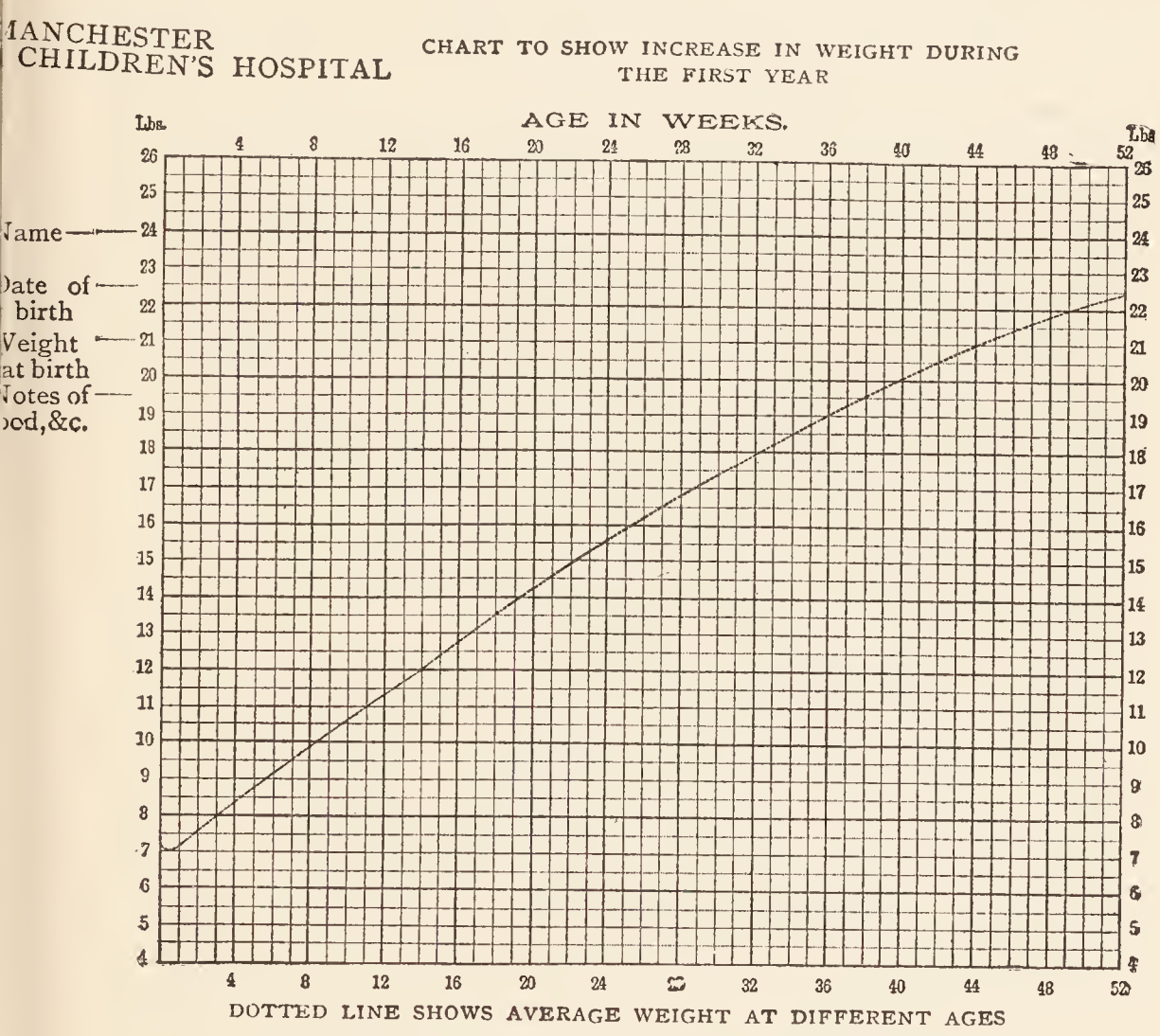


FIG. 3.—Weight Chart, showing Normal Weights during first Year. The Infant's weight every week can be filled in with ink or pencil.

some importance to keep a record of the weight, and for this purpose a weight chart may be used, which can be attached to a board and hung up in the nursery. In the accompanying chart, fig. 3, the

[1] *See* Appendix.

average increase is indicated by a dotted line. Fig. 4 shows the weights of two infants who weighed respectively 1 lb. 14 ozs. and 2½ lbs. at birth (see p. 33).

Baby chairs, baby-walkers.—When the infant is nine or ten months old and can sit up strongly, a chair of some sort becomes a necessity. Care must be taken

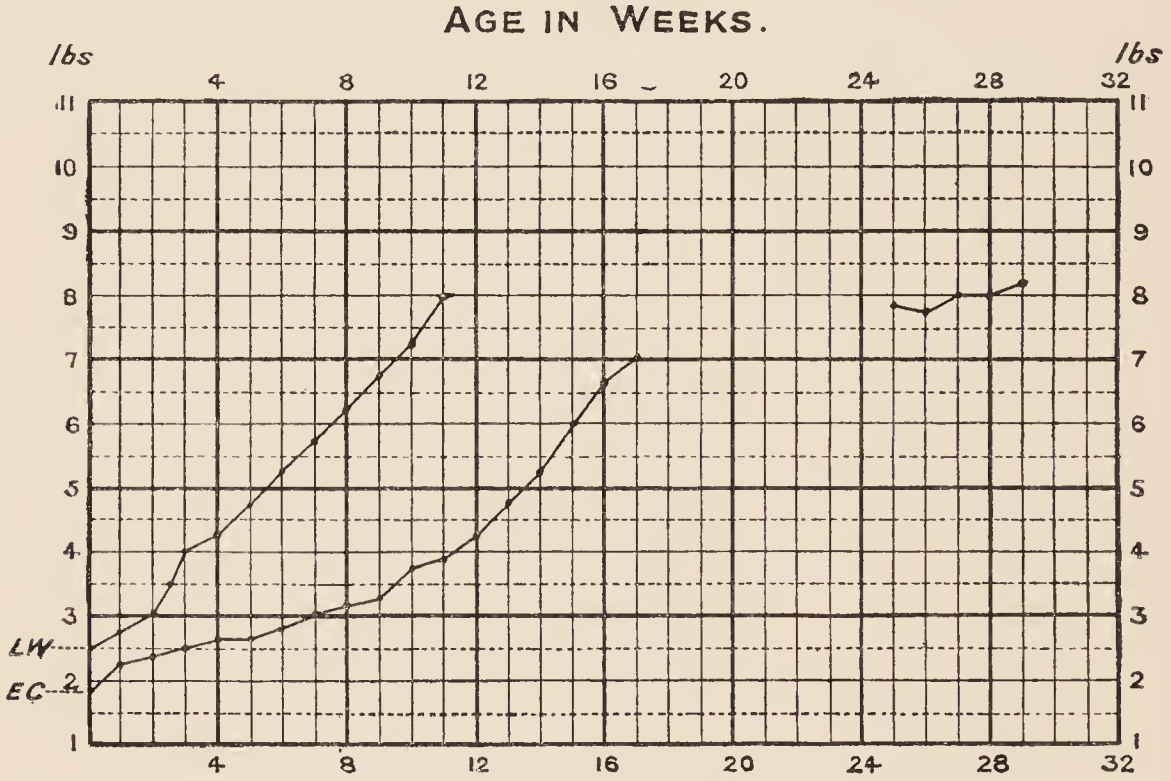


FIG. 4.—Weight Chart showing Weights of two Infants born prematurely.

E. C. weighed 1 lb. 14 ozs. at birth, and gained regularly till the seventeenth week; an illness supervened which prevented her from being weighed again till the twenty-fifth week. L. W. weighed 2½ lbs. at birth; in this case the gain was continuous and rapid. (Dr. Mumford's cases.)

that such a chair is of stable equilibrium and not easily knocked over, as an accident might be attended with serious consequences. It is a great boon to the nurse to be able to leave the baby safely for a short time while it plays with its toys. Swings are also very

useful, but the child must be surrounded by a net so that it cannot come to any harm. Some swings are so provided and are perfectly safe. In fine warm weather the swing can be suspended in the garden.

The 'Normonic suspension baby-walker'[1] is another useful and ingenious contrivance for an infant which is old enough to sit up strongly. When used as a chair, the infant can be comfortably seated with its toys before it and left quite safely without fear of harm. It can be wheeled about the nursery floor or on a lawn in fine weather.

Let no mother be tempted to use any of these contrivances for too young an infant. Sitting up is tiring work even for a child of ten months, and must not be allowed for long together. The lying-down position is the best for infants if they are to be left for a time. After the first year more sitting up may be indulged in, but the tendency is even then to allow infants to sit up too much instead of making them comfortable in a lying-down position on a rug spread out on a bed or on the floor.

Carriages.—A perambulator mounted on good springs, in which the infant can lie down as comfortably as in its cot is a prime necessity. It is well enough for the infant to be carried out for the first few times by the monthly nurse when the outing is for a few minutes only. But it is not good for the infant nor fair to the nurse to allow this for long. An infant is in a far more comfortable position lying prone on a mattress in a carriage with good springs and cushion tyres than it can possibly be huddled up in its nurse's arms, and moreover carrying a heavy baby

[1] *See* Appendix.

for long together is arm-aching and back-aching work. The mattress must fit nicely in the carriage, and an old blanket be placed to cover it, while a small pillow is provided for the infant's head. It is well to use a 'Gamgee tissue' napkin out of doors to prevent the wetting and soiling of the clothes.

A light rug or wrap should be thrown over the child. Veils are not necessary for healthy infants.

Mail carts ought not to be used for infants under a year or eighteen months of age, the sitting up position is too tiring for babies. They should take their airing lying down.

CHAPTER III

THE HYGIENE OF INFANCY AND CHILDHOOD

The care of the newly-born.—It must be clear to every one that a complete change takes place in the life conditions of the infant when it has entered the external world and commenced life on its own account. Before birth it is surrounded by a warm liquid, which is maintained at a blood heat by the mother, and this not only prevents it from losing heat but protects it from shock. The mother's blood supplies it with oxygen and carries away its waste products ; its lungs therefore have no work to perform. The mother's blood also supplies it with nourishment in a form ready prepared and suitable for building up its tissues ; its digestive system therefore for the time being is inactive. It spends its life in continuous sleep ; it is resting and gaining energy for the busy life which awaits it.

At birth separation from its mother starts the respiratory movements, and henceforth the infant takes its supply of oxygen direct from the air. The external surface of the body is no longer protected by a warm fluid, but is subject to the drying influences of the atmosphere. The infant has now to obtain its nourishment through the mouth and the digestive system begins its career.

All these considerations naturally impress upon us that great care must be exercised in dealing with the newly-born, in order to prevent or mitigate the possible injurious effects which are liable to occur in connection with the great change which takes place in the life of the infant at birth.

The first duty of the nurse, after the mother has been washed and attended to, is to wash and dress the infant. Assuming that the infant is strong and lusty, the sooner this is done the better, so that it may be dressed and put to sleep in its cot. In the case of an infant prematurely born or of low vitality, it will probably be wise to put off the washing operations, and to wrap it up at once in cotton wool and deposit it in a warm place. The room in which the infant's first toilet is performed should be thoroughly warm, say at a temperature of 65° F., and the washing and dressing is generally done before a good fire.

One of the nurse's first cares should be to examine the baby's eyes, and to carefully wash away with a piece of clean absorbent wool any of the slimy matters which may have adhered to the eyelids during birth. The eyes should then be bathed with a warm solution of boric acid or weak Condy's fluid.[1] The inside of the mouth and lips should be treated in the same way. The bath water should not be too warm—100° F. is warm enough—and it is needless to say that the infant should be very carefully handled during the washing operations. The whitish slippery material with which the infant is covered at birth, and which adheres tenaciously to it, must be removed by means of soap and water and a piece of old

[1] *See* Appendix.

flannel or lint. The slimy material will be removed more readily if a little sweet oil be applied to the skin first. The soap used for washing the infant must be of a non-irritating kind, such as pure Castile, or some of the brands which are made with a smaller proportion of alkali than those used for adults or in the household.[1]

The surface of the skin should be carefully dried with a soft towel, and the navel cord dressed with some clean absorbent material, such as 'Gamgee' or 'Robinson' tissue, or a pad of absorbent cotton wool, some dry boric acid or Sanitary Rose powder having been dusted on. The navel cord, which should have been cut as short as possible, gradually dries and separates before the end of the first week.

The binder should be of soft flannel and must not be applied tightly; its object is to keep the dressing on the navel in place, and not to bind the baby up; it will certainly do harm if it is tight enough to compress the chest or stomach. The washing of the infant will give the nurse the opportunity of examining the infant thoroughly and calling the doctor's attention to any abnormal condition, such as 'birth marks,' which she may detect. After the washing and dressing the infant will probably be inclined to sleep.

During the first week or two the infant sleeps a great deal and takes comparatively little food. Before birth there is continuous sleep, and for a time after birth this disposition continues in spite of the greater activity of the respiratory process.

It is hardly necessary to say that a cot should be provided for the infant, and that on no account should it be allowed to share its mother's or nurse's bed. To

[1] *See* Appendix

this rule there is no exception ; it is highly dangerous to allow an infant to sleep in bed with an adult, as the many accidents which are frequently occurring, not only among the poor and ignorant but also among the well-to-do classes, bear testimony. Care must also be taken, when the baby is put to bed in its cot, not to cover up the face as is so often done ; the infant wants as much air as possible, and there is a certainty of its breathing its own expired air over again if its head is beneath the bed-clothes.

Soon after its first meal the infant usually passes a stool. For the first few days after birth the stools are of a greenish-brown colour, and consist of the bile which has accumulated in the intestine before birth ; the term ' meconium ' is used for these greenish stools. In a few days the stools become semi-fluid and of a bright yellow colour and quite homogeneous. They should have no offensive smell and contain no curd of milk. An infant usually passes two or three such stools a day.

Castor oil is mostly not necessary to clear out the bowels during the first week, and in some cases it will gripe and give rise to colic ; if an aperient is desirable, half a teaspoonful or more of sweet oil will usually answer the purpose.

The infant mostly passes water within twenty-four hours of birth, and after this continues to pass water ten or twelve times in the twenty-four hours. Great care must be taken to remove soiled and wetted napkins at once, for nothing is so likely as a damp napkin to give rise to soreness and redness of the skin of the buttocks. On removing the napkins the skin should be thoroughly washed with warm soap

and water and well dried. If there is any soreness it is best to dispense with soap and to use 'carron oil' to remove the secretions and cleanse the parts. Dusting powders are not necessary when the skin is healthy, but where there is any tendency to redness, some 'Sanitary Rose' powder or 'Rimmel's prepared oatmeal powder' may be used. The great point is to thoroughly cleanse after each wetting and wipe quite dry.

The care of premature infants.—The normal duration of pregnancy is forty weeks. Infants born before the end of this time are called premature. It is obvious that such infants require very special care if they are to be successfully reared. Infants born before the end of the twenty-eighth week, if they show any signs of life at all, usually live only for a few hours, being too feeble to contend with the conditions of independent existence. It is rare for infants to be reared if they are born before the end of the thirty-second week. Such infants are very small and shrivelled-looking, weighing under 3 lbs.; their skin hangs about them in folds and is of a dull red colour. They are drowsy, the cry is feeble and their movements sluggish. When pregnancy extends over thirty-two weeks the infant may weigh 3 to $3\frac{1}{2}$ lbs., and its chance of being reared is much improved. At thirty-six weeks the weight is usually 4 to 5 lbs., at thirty-eight weeks 5 to 6 lbs., and at full term 7 to $7\frac{1}{2}$ lbs., though newly-born infants have been known to weigh 12 or even 18 lbs.

If the weight of an infant at birth is below 3 lbs. its vitality is very low, and the chances of its being

reared are small unless an 'incubator' can be used. (For two successful cases see weight chart, fig. 4.)

The more immature the infant, the greater must be the care exercised in its general management. Immediately after birth the infant is enveloped in absorbent cotton wool without any attempt being made to bath or cleanse it. Layers of cotton wool are wrapped round the body and separate layers round the limbs. The napkin must be of a similar material. Its first cot is usually a basket with a flannel lining, and a mattress of cotton wool. India-rubber hot-water bottles should be arranged inside the basket at a safe distance from the infant. The room must be kept at a temperature of 70° F. at least, and be well ventilated, so that the infant can have fresh pure air. It should be handled as little as possible; bright lights and loud noises should be avoided. Probably the infant will be too feeble to take the breast, and if there is any milk in the breasts it will be wise to draw it off with a breast pump and give it to the infant with a spoon, or better with a small pipette (see fig. 5).

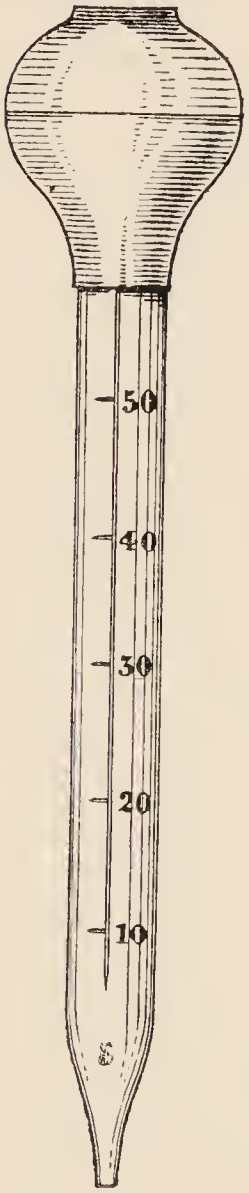


FIG. 5.—Pipette, graduated, for feeding weakly Infants.

Unfortunately in many of these cases the mother has no milk and artificial feeding will have to be resorted to. Whey may be given, or a weak pasteurised cream mixture

(see p. 91). Sometimes it is necessary to feed weakly and premature infants by means of a small rubber tube passed into their stomachs.

'Incubators,' 'Brooders' or 'Thermostatic nurses.'[1]—These are small cases or chambers which can be artificially warmed and ventilated, in which the infant can be put. Their use does away with the necessity of keeping the nursery at a high temperature, such as 70° F., a temperature very trying for the nurse and attendants. The child can be fed as it lies in the incubator, or it can be taken out for the purpose.

Nevertheless if great care be taken to carry out all the necessary details in feeding and protecting from cold, an incubator is in most cases unnecessary in a private household, and two trained nurses are required to manage it. Incubators are more usefully employed in hospitals and foundling institutions. The cases referred to on p. 26 were reared without an incubator.

[1] *See* Appendix.

CHAPTER IV

THE HYGIENE OF INFANCY AND CHILDHOOD (*continued*)

Sleep.—For two or three days after birth the infant practically sleeps all its time, and may perhaps have to be roused to take food. This drowsiness is usually well marked after a prolonged and tiresome labour, and in this case it may take several days to shake off. There need be no anxiety for the first few days at least, if the drowsiness be continuous and but little food taken.

For the first few weeks the waking hours only amount to about two or three out of the twenty-four, some twenty-one or two being spent asleep. After the first few weeks and for the next six months the infant sleeps some eighteen to sixteen hours out of the twenty-four. It should sleep continuously from eleven at night to four or five in the morning. I expect that there are a good many mothers who wish this were always so.

A good monthly nurse will take the greatest pains to train the infant to go to sleep at once when put into its cot. To induce sleep the infant must have had a good meal, the cot must be warm, the room darkened and quiet. No comfort or teat should be

allowed, and no vigorous rocking; indeed, rocking is quite unnecessary, and it is well not to begin it.

At six months of age the infant ought to sleep from ten o'clock at night till six in the morning without waking, and consequently without a meal. A good sleep must be taken also during the day, and much of this sleep in the summer time should be in the open air.

At one year old the infant will sleep the clock round at night, and for some two or three hours during the day. At this age the child is far more active than he was and less somnolent. He will look about him when riding in his carriage, and take a keen interest in all that goes on in his nursery. It is of great importance that he should have one or two sleeps during the day. Little brains and little muscles easily weary, and want long periods of rest if they are to grow and be strong.

At two years of age the child will be in bed by six o'clock and sleep until six in the morning, but every nurse knows to her cost how early a child is awake and ready to play when the mornings are light and the nights short. A firm hand is often required to prevent all sorts of trouble and mischief in the early morning. A midday sleep of at least an hour must be taken by children from the ages of two to six years.

Disturbed sleep and wakefulness is, in the majority of cases, due to discomfort caused by indigestion. There is pain and uneasiness in consequence of the stomach or bowels being distended with gas, or perhaps food lying there undigested, the most fruitful cause of this being overfeeding. In

some few cases, especially in breast-fed infants, the wakefulness may be due to hunger, the mother's milk being poor and not satisfying the child. Some infants and children are inclined to be wakeful quite apart from any question of indigestion. In some cases this may be due to over-excitement before going to bed. With others it is the result of bad training and too great indulgence. The child should be made to lie down, to keep quiet in a darkened room, and on no account to be taken up and played with.

All forms of 'soothing' syrups which contain opium, chloral, or bromide are uncertain in their effects and dangerous; they should not be given except under medical direction.

The use and abuse of napkins.—These unsatisfactory articles of clothing are necessary evils, to be done away with as soon as possible. To train the infant to cleanly habits, so that the napkin is wetted but seldom or not at all, and to manage early to do without it altogether, should be the aim of every good nurse. The necessary training should begin almost from the first, the infant being held at intervals, especially after each feeding, over a chamber vessel. By three months old the napkin ought to be wetted but seldom during the day, and by ten months of age be dispensed with in the daytime.

It is a great advantage when the child has got to the crawling stage to be able to do without it, as napkins at this time, if the child is active and able to use its legs, easily get out of place. Most children, if they have been carefully looked after, are able when a year old to indicate their wants to the nurse, but she certainly will have to anticipate their wants in

this respect several times during the day. The napkin will most likely be required at night for another year, but it need seldom be wetted if the child is well looked after.

Unfortunately, weakly and backward children are apt to have irritable bladders and bowels, and in such the napkin is a necessity long after it has been discarded by healthy children. There is not much doubt, however, that much of the night bed wetting, which is apt to occur in some older children, might have been avoided by more careful training in their early years. Prevention of bad habits is much easier than their cure when established. A child that has become used to lying in damp and soiled clothes at night does not seem to feel the discomfort, and loses the sense of shame which other children have when they have accidentally wet their beds.

Exercise: fresh air.—The first exercises an infant takes are the kicking movements which he indulges in with so much delight as he lies on his back on a bed unhampered with his napkin or clothes. The feeling of freedom from all restraint and the ability to use his limbs bring joy to his small self. This daily 'free kick' is a part of his education which should be encouraged by affording him every opportunity for its indulgence. Having made sure that the room is warm, and that he is safe on a mattress or on the floor, then let him kick and crow to his heart's content. He delights in being tossed up and down in his mother's arms, or in kicking and splashing in his bath. After a while, when he has become too active to be allowed to remain in safety on a bed, a rug must be arranged on the floor out of reach of draughts.

Crawling may be indulged in to any extent without fear of the limbs giving way, as the hands and arms support as much weight as the legs, and thus the weight of the body is distributed. He will crawl along the nursery floor from chair to chair, and having arrived at what he considers a safe and fixed support, will pull himself up on to his legs and stand with the help of a chair. Some children will sit cross-legged on the floor and propel themselves sideways with a sort of rowing movement of the legs. Care, however, must be taken that the child does not indulge too much in this crossed-legged position or mode of progression, as if the bones are soft they may easily get bent into a curve.

At the end of the first year the infant is often fat and heavy, while his muscles are not well developed; moreover the bones and ligaments are still immature and may easily be bent or stretched if too great or continuous strain is thrown upon them. Exercise of the muscles short of fatigue is good, but the joints are too loose to allow of the weight of the body being sustained by the legs. A sort of compromise has to be made; the child may be allowed to sit up to the table in a high chair, or one of the low forms of chairs with a small table in front of him for his toys, or he may sit in a safe swing or crawl on a hearthrug on the floor.

Through the whole of infancy and childhood the child is taken out daily into the open air in a baby carriage or mail cart. For the first year the four-wheeled carriage is the best, as the infant is more comfortable and less tired, and can be kept warmer in the lying-down position than when sitting up. When the child is old enough and strong enough to walk

for awhile out of doors, care must be taken not to overdo the walking, and the mail cart must always be at hand to give the little toddler a lift.

In warm weather the infant may be taken out in the open air by the end of the first week, but in cold weather it will be well to wait till the infant is three or four weeks old. It is wise to accustom the newly-born infant to slight changes of temperature in the house by carrying it from one room to another before taking it outside. This may be arranged for by giving some large room a good airing by means of open windows and then taking the infant, well wrapped up, for a walk up and down the room. This may also be done daily in wet weather.

No infant thrives well if confined to hot rooms for weeks and months together; they get pale and suffer from indigestion. Chills are certainly bad, and the difficulty comes in with those infants who are exceedingly apt to get a bronchial catarrh from cold; but all the same, even for these too much of a stuffy atmosphere is bad, and changes from one room to another under safe conditions must be taken if they are to thrive. Continuous imprisonment in one steam-heated room sadly interferes with health.

The first airings which an infant gets should be short, say for fifteen minutes in a room in which the windows are open, or if the weather is fit in the open air. Cold weather, if the sun is shining and there is no driving wind, need not prevent the child from going out if well wrapped up. But high winds, especially when from the east, or excessively damp weather, are more risky for an outing.

For the first few outings the baby should be

carried by the nurse, but after the time comes to be extended beyond fifteen minutes the baby carriage must be used, care being taken to keep it warm by means of a hot-water bottle. An absorbent wool napkin is better when these expeditions are being taken than an ordinary 'swansdown' one.

Infants and young children are easily tired, both by much exercise and by over-excitement. This over-tiring is very apt to take place during the summer holidays by the sea-side. Everything is fresh and novel, and the whole day is spent in far more active exercise on the sands or in sight-seeing than is the case at home. As a result, before the end of the first week the children are cross and peevish, and apparently worse than when they left home, much to the astonishment of their friends who were expecting a great deal from the change. Very likely, as well as being over-tired they are eating too much, or paddling in the sea and getting their clothes damp. The parents begin to think that the 'air of Mudhook Bay is too strong for the children,' or 'it is too relaxing,' when all the time they are themselves to blame for letting the children *do* too much and *eat* too much. Presently some of the novelty of the sea-side wears off, the children settle down to their ordinary ways of life, they take more rest and eat less, then they improve and the 'air' begins to suit.

CHAPTER V

CLOTHING FOR INFANTS

It has already been pointed out that infants, on account of their very vascular skins, lose heat much more readily than adults, while at the same time their circulation is comparatively poor and their heat producing powers are feeble. As a result of this, infants are more likely to suffer from the effects of a chill than older people, and the effects of this chill may be more serious. Colds in the head, bronchitis, colic and diarrhœa are not infrequently the results of chills. It is therefore very necessary that infants should not be exposed to cold winds or draughts, and their bodies must be well protected by warm clothing. The best material for clothes is some fabric which conducts heat badly, so that the body heat may be retained as much as possible. Linen and cotton are good conductors of heat, and are therefore unsuitable for infant clothing; silk is a comparatively poor conductor, while all forms of wool conduct heat badly, and are in consequence very suitable for the clothing of infants and children.

But the infant's clothes must not only be made of a material which is a bad conductor of heat, but this material must be light and loose in texture. as a heavy

garment will not be suitable and constriction of any part must be avoided. Woollen garments, flannel or knitted, fulfil these important conditions.

The infant's clothes should be fastened with buttons or strings ; pins are to be avoided as much as possible, except for napkins, and stitching causes unnecessary delay in dressing operations. It is important that all garments should be made so that they may be easily taken on and off. Any one who has watched the 'operation' of rolling up an infant in a broad flannel bandage fastened with stitches, and then the clothes put on one after another, while the baby is turned first on to its stomach, then on to its back, will surely wonder how it is that the thraldom imposed by the ignorant type of monthly nurse has been endured so long by the present and past generations of mothers. Customs, however foolish, die hard, and there still seems to be a legion of nurses who implicitly believe in the necessity of bandaging up the body of an infant like a mummy, and securing the roll of flannel after being pulled tight, with a row of stitches. It is surely not necessary to say that such bandaging is harmful, for any compression of the abdomen and chest prevents the proper expansion of the lungs, interferes with the circulation, and increases the risk of 'rupture.' We must bear in mind that the size of the abdomen alters in circumference from time to time during the process of digestion.

I will endeavour shortly to describe a rational outfit for a newly-born infant, and in doing so must express my indebtedness for many hints to a pamphlet on dress reform, published by E. Ward & Co.[1]

The 'binder.'—The object of the binder is to

[1] *See* Appendix.

keep the dressing on the navel in its place, and not in any sense to bind or bandage up the abdomen. No doubt it also acts as an article of clothing which helps to protect the abdomen. The binder is not really necessary after the cord has separated; it can then be replaced by a Shetland wool belt, or if fitted with tapes be continued for some time longer.

The best binder I know of is one which consists of two strips of flannel four or five inches wide and taped round their edges; these strips are laid one on the other and sewn together in the middle. The inner strip is the longer of the two, being about twenty-one inches in length, while the outer one, which has tapes for fastening attached at its two ends, is some four inches shorter. The infant is laid on its back on the binder, the inner strip is wrapped round the abdomen, the ends overlapping one another, then the outer ones are folded over and the tapes fastened (*see* fig. 6).

The binder, as I have said, can be discarded before long, and a knitted band secured by tapes substituted. Belts made in one piece of Shetland wool form an exceedingly light and warm protection for the abdomen, and are readily slipped on and off. These belts are especially suitable when the dress is shortened (*see* fig. 7).

The **napkin** is the most unsatisfactory article of an infant's outfit. Nothing can be more insanitary than a damp cotton diaper pinned tightly round the infant's waist. The infant becomes quickly chilled, and the skin of the buttocks sodden and excoriated; the tight pinning causes pressure on the internal organs and obstructs the circulation of blood.

Various materials are in use for diapers; the

first set are usually made of 'swansdown,' and later Turkey towelling is often used. A plentiful supply must be provided, so that there may be no hesitation in changing the diaper whenever it is soiled. By far the best material for the purpose is 'Gamgee' or 'Robinson' tissue, which absorbs the excretions well while it is warm and soft. This material can be obtained in rolls, from which triangular shaped pieces of the proper size can be cut and the edges run; these diapers can be obtained ready made at a slightly higher cost.[1] The napkins are burnt at once when taken off, so there can be no accumulation of foul smelling diapers waiting for the wash.

Whatever form of napkin is used it should be applied loosely, and if it is secured by a band attached to the 'long flannel' there is no fear of its slipping off.

For our variable climate it is preferable that all three of the principal garments worn by the infant should be made of woollen fabric, but the thickness of the material may vary with the season of the year. It is important also that they should be so arranged that they can easily be put on and as readily taken off, and to facilitate this, the clothes should all fasten either front or back, so that it will not be necessary to change the position of the infant during the time it is being dressed. This will save time and spare the infant some discomfort. Clothes fastening behind are in some ways the most convenient for dressing, as the arms fit into the sleeves somewhat more easily when the child is lying on its stomach on the nurse's knees than when lying on its back. But, on the other hand, the napkin and binder are more readily applied from the front. In Ward's hygienic outfit the

[1] *See* Appendix.

clothes are all arranged to be put on when the infant is lying on its back, and this on the whole seems the most convenient. The outfit consists of the binder,

FIG. 6.—The Binder.

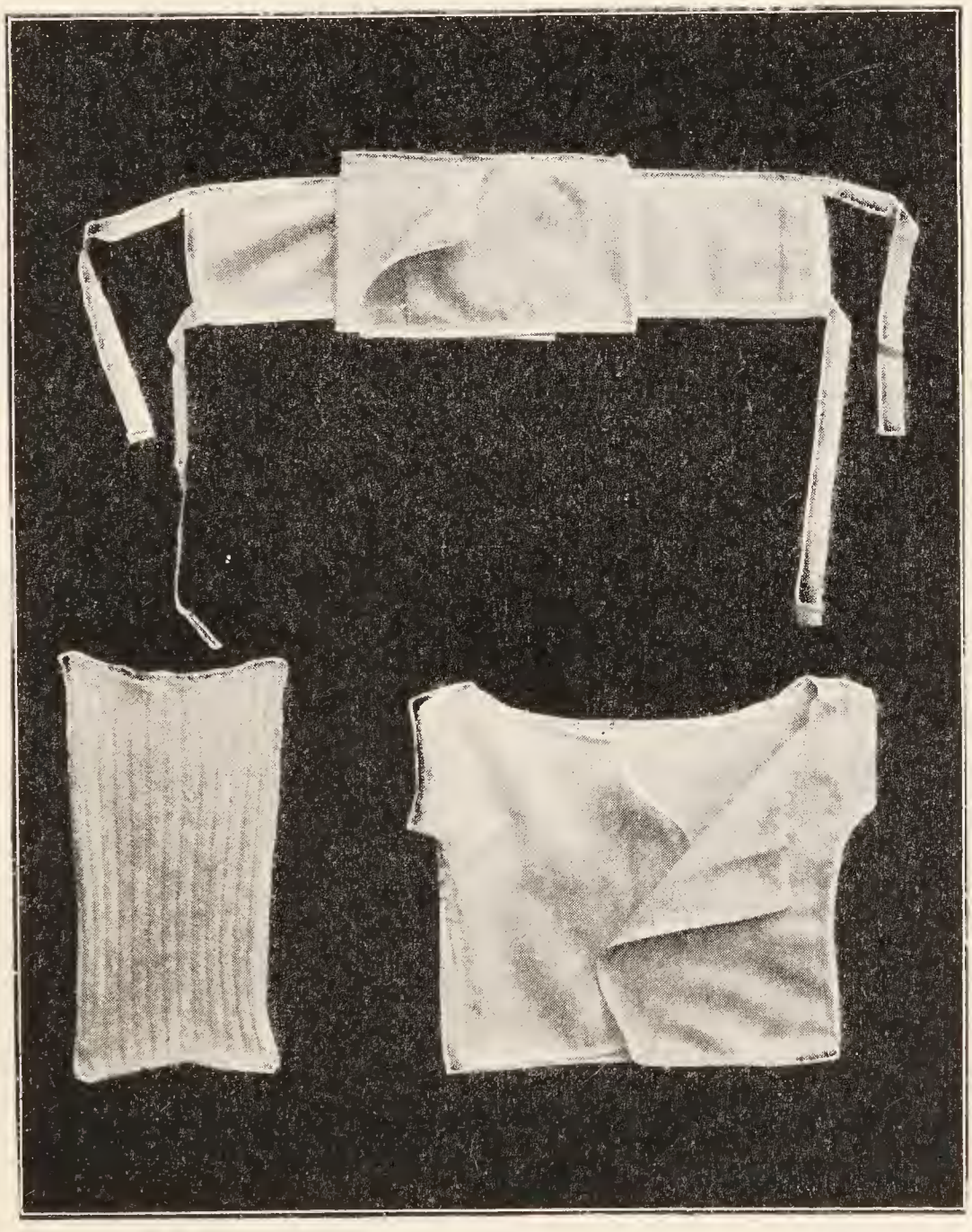


FIG. 7.—Shetland Wool Abdominal Belt.

FIG. 8.-- Infant's Vest.

napkin, vest, long flannel and monthly gown. The garments are arranged ready for putting on in their right order, one above the other with the binder uppermost, the sleeves being inside one another. The baby is laid with its back on the clothes, the binder and napkin applied, and the other garments are then fastened up. The whole process is necessarily much shorter than it is with garments that necessitate turning the infant over and over.

The **shirt** or **vest** consists of Cashmere or flannel, and should be just long enough to reach the hips; if longer it runs a risk of getting wet from contact with the diaper. It is unnecessary to have long sleeves to this garment if the long flannel and monthly gown are provided with them (*see* fig. 8). Shetland wool vests or fine ribbed wool vests are very suitable, as they are so warm and light, but they have to be slipped on over the head, and are more suitable for infants a few months old than for newly-born infants.

The **long flannel** or middle garment is made of soft flannel; it opens along the entire length in front, and reaches some two or three inches below the feet. Any length beyond this is wholly unnecessary and confines the infant's limbs too much. The long garments into which the newly-born infants are usually put are very inconvenient and senseless. The long flannel consists of a jacket with long sleeves and a skirt. The sleeves, instead of being set in armholes, are so cut that the top part runs up the neck between the shoulder seams, thus giving plenty of room for the shoulder, and this arrangement is convenient for getting the infant's arm in when being dressed. The skirt is made to button to the waist of

the jacket, and can thus be removed if wet and replaced by another without the necessity of changing the jacket. A band is attached to the waist for supporting the diaper; it passes between the infant's



FIG. 9.—The Long Flannel (E. Ward & Co.) shows the skirt removable from the jacket, the jacket fastening in front; the band for supporting the napkin is shown.

thighs round the diaper, and buttons in front (*see* fig. 9).

The **monthly gown** is cut in the same way as the long flannel, except that it is all in one. It buttons down the whole length in front, and may be embroidered in any way which the infant's female relatives suggest; a loose band round the waist keeps the dress in its place, and may be tastefully stitched or trimmed. The gown may be of cambric or silk for summer wear, and some all wool fabric for winter. Knitted 'bootikins' or stockings, long enough to be pulled up to the knees, keep the feet warm; they must of course be changed when they get wetted, as they are very apt to do.

A night gown of some woollen fabric will of course be provided; it should be cut after the fashion of the monthly gown. A vest may be worn beneath in winter.

For out of doors a woollen knitted hood, a warm light jacket, and a pair of 'infantees' for the hands will no doubt be provided. Knitted woollen overalls, or 'bootikins' and drawers in one, pulled up so as to enclose the napkin, are useful to wear out of doors.

When the infant is six months old, the 'long flannel and 'monthly gown' are best shortened, so that they only reach to just above the ankles. This allows freer play for the legs.

At a year old the napkin can mostly be discarded during the daytime, though, of course, accidents will at times occur. To prevent accidents and also to avoid chills, it is necessary to provide the child with woollen pants. The child is now most likely creeping and crawling from place to place, and likely enough

to get colds if its legs and buttocks are left unprotected. Flannel or woollen pants must be worn, which fasten round the waist and which can be easily and quickly changed if they get wet. A Shetland wool vest will now be worn next to the skin. Assuming that the inner garments are of wool, and are warm and light, the outer garments may be left very much to the taste of the parents; the thickness of the material will, of course, vary with the season of the year. The Shetland vest should have long sleeves, summer and winter; the outer garment also should have sleeves. The practice of allowing children to have bare arms and legs cannot be sufficiently condemned. Care must be taken that too heavy a weight is not hung from the waist; loose woollen pants fastening at the knees give much more protection than petticoats.

For out of doors a light straw hat for the heat of summer, and a knitted Tam-o'-Shanter wool cap in winter or in windy weather, form the best head-gears for out of doors. Nothing can be more absurd than the bonnets and fancy hats which some unfortunate children are condemned to wear by their parents.

Shoes and boots.—No part of a child's clothing is of more importance than the shoes or boots it wears. A child's foot is easily deformed by tight or badly shaped shoes, and enlarged joints, corns, bunions, and chilblains follow as a matter of course. Unfortunately, children's boots are mostly made to follow fashions, and the feet and toes are squeezed in order to make the foot fit the shoe, rather than the shoe being made to fit the foot. So much has this been felt, that some parents prefer their children to wear sandals instead of shoes.

For the months preceding the walking or crawling period, knitted woollen shoes afford sufficient protection and warmth, and being soft and readily stretched cannot harm the feet. It is when the child wants some protection for the soles of its feet that the trouble begins. The first boots or shoes should be



FIG. 10.—Normal Footprint of an Infant three months old.

made of soft pliant leather, such as kid, with sufficient breadth so as not to crowd the toes, at first without heels, later when used for walking out of doors with a low broad heel. It must be borne in mind that too large shoes, in which the feet slip about, are uncomfortable and bad for the feet, and likely to produce blisters. For out of doors boots fastened with laces should be

preferred to those fastened with buttons, as they can be better regulated as far as tightness is concerned. High uppers are to be avoided as tending to constrict the tendons and muscles of the calf. The



FIG. 11.—Normal Footprint of Child of twenty-two months who had never worn shoes.

uppers should only just cover the ankles. The boots should be 'rights and lefts,' and not both the same shape.

A comparison of the shape of the ordinary infant's

shoe with the footprints represented in figs. 10 and 11, will demonstrate that a bending of the big toe, towards the middle line, and crowding together of the



FIG. 12.—Radiograph of the Foot of a Child of fourteen months who had worn boots (Lancashire clogs) with pointed toes, showing how the toes have been pressed together and overlap one another.

small toes is certain to take place if such a shoe or boot is worn. Fig. 12 shows that this has taken place, the toes being crowded and overriding one another

through wearing an improper shoe. The shoe should be straight on the inner side, so as to give the big toe full play in walking, and not press it in towards the other toes. This lateral deviation of the big toe tends to the production of flat foot and loss of support in walking. Boots and shoes of a rational shape, giving room for the toes and made with low broad heels, can be obtained in most cities; the majority of bootmakers, however, seem indifferent to the matter, and are anxious to sell shoes of a 'smart' and fashionable shape with pointed toes. The fault really lies at the door of parents, who persist in allowing their children's feet to become deformed through wearing narrow boots, and make no effort to secure boots and shoes of a rational shape.[1]

Sandals.—Recently sandals have come into fashion both for young children and those of older growth. Sandals if well made and fitted have the advantage over tight or badly shaped boots and shoes, as while protecting the soles of the feet they do not deform the feet or interfere with the circulation of the blood. They are excellent for wear during a summer holiday by the sea-side, and there is no reason why robust children brought up in the country should not wear them all the year round, though they must be uncomfortable during wet weather and when the roads are muddy. On the other hand, weakly children with poor circulations should not wear them except in hot and dry weather. Cold feet are productive of catarrhs of the bowels and bronchi, as well as irritable bladder and kidneys.[2]

[1] *See* Appendix. [2] Ibid.

CHAPTER VI

DENTITION

FOR the first seven or eight months of the infant's life it is toothless, though in exceptional cases teeth make their appearance within a few months of birth, and in rarer cases the infant is born with a tooth or teeth ready cut. The period of the first dentition usually extends from the seventh month till the middle of the third year, though exceptions to this are far from uncommon. When the child is two and a half years old, assuming that the first dentition is complete, each jaw is provided with ten teeth, making twenty in all (*see* fig. 17). There are four incisors in front, known by their cutting edges, two canine or eye teeth, one on each side, and behind these, two on each side, are the molar teeth, which do the grinding or crushing of the food.

After the first dentition is complete, no new teeth appear for the next four years, the first set of teeth doing all the work during this time. At six years of age, or a little before, the first tooth of the permanent set—namely, one of the 'six-year-old molars'—is cut. These latter teeth do not replace any of the first set, but appear behind the last molars of the first set, two in each jaw. During the next six or seven years the milk teeth are gradually replaced by the permanent set, while the appearance of the

'wisdom teeth' is delayed till the age of twenty-one years, or perhaps later. The permanent set consists of thirty teeth in all.

As the subject of children's teeth is a matter which interests all mothers and nurses, I will describe the process of tooth-getting more in detail. The infant's teeth are developed in small cavities or 'sacs' in the jaws, and at the time of birth the temporary set of teeth are already partially formed and in part calcified. After birth the development of the teeth in their sacs proceeds rapidly, the sac and its contained tooth enlarging, so that the latter may be plainly seen in the infant's mouth occupying the site of the future tooth. At seven or eight months of age the cutting edge of the lower incisors may often be felt beneath the mucous membrane on the surface of the gum. The edge comes nearer and nearer to the surface, and the membrane covering it becomes thinner, until the latter is divided by the pressure of the advancing tooth, and the edge of the tooth can be seen and felt on the surface of the gum. The first set of teeth appear more or less in groups, that is, two or more are quickly cut one after another, and then an interval occurs before the next group appears. There are frequent exceptions to this rule, but the following is a common way for the groups to appear.

First group.—The lower two central incisor teeth appear usually from the seventh to the eighth month, and then there is a pause of six to eight weeks (*see* fig. 13).

Second group.—The upper four incisors are cut at intervals of a few weeks, usually during the ninth or tenth month, the central appearing before the side

ones (*see* fig. 14). Then there is an interval of one or two months.

Third group.—The lateral incisor teeth of the lower jaw, and the upper and lower front molars, appear at short intervals during the twelfth and thirteenth months (*see* fig. 15).

Fourth group.—The canines or eye teeth are usually cut during the eighteenth or twentieth months (*see* fig. 16).

Fifth group.—The back molars appear during the first half of the third year (*see* fig. 17).

It must not be supposed that the above stages of teething follow one another with mathematical precision as regards time and order; for even in healthy children there are often delays arising from ill-understood causes, or there is a change in the order in which they appear. Delay in the appearance of the teeth is common enough, or a certain stage may be reached in good time, and then many months may elapse before another tooth comes through.

The following table shows the relation of the temporary to the permanent set. It will be noted that the temporary molars are replaced by the bicuspids, while the permanent molars appear behind the temporary molars:—

TABLE SHOWING TEMPORARY AND PERMANENT SETS OF TEETH

		mo.	ca.	in.	in.	ca.	mo.		
Temporary set	Upper	2	1	2	2	1	2	= 10	20
	Lower	2	1	2	2	1	2	= 10	

		mo.	bi.	ca.	in.	in.	ca.	bi.	mo.		
Permanent set	Upper	3	2	1	2	2	1	2	3	= 16	32
	Lower	3	2	1	2	2	1	2	3	= 16	

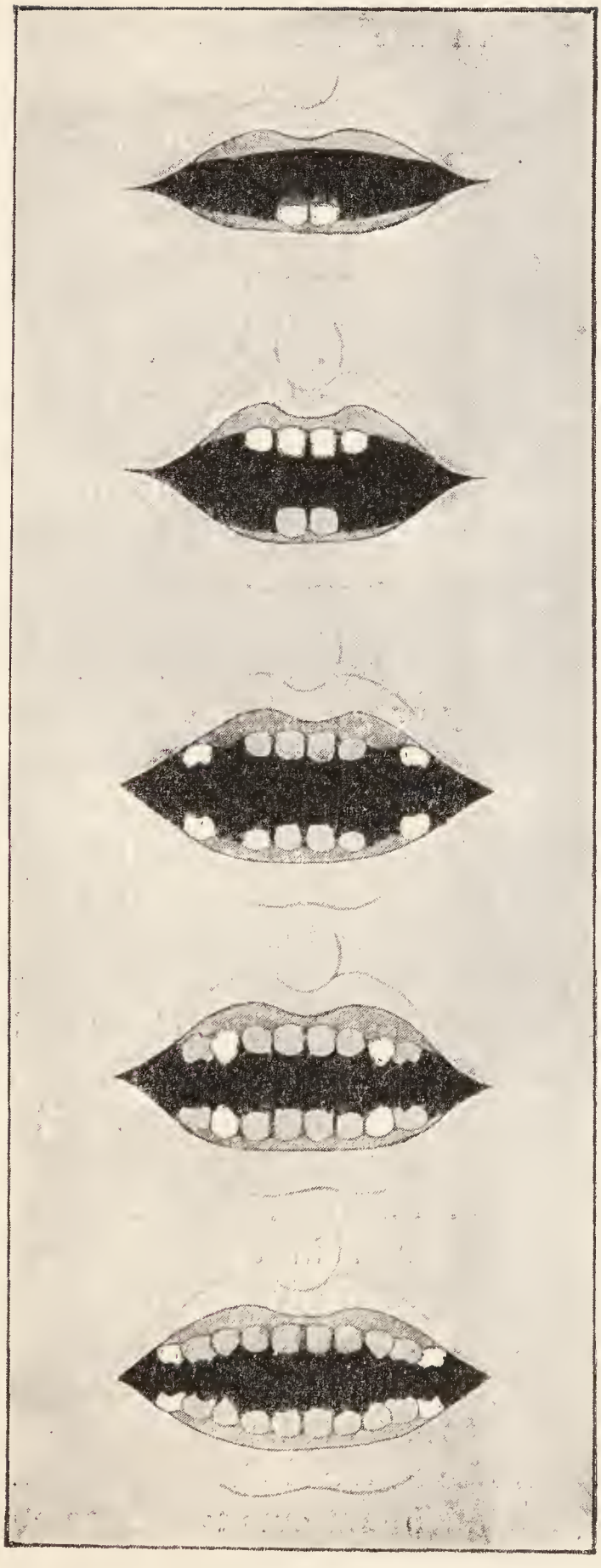


FIG. 13. — Showing the Two Central Lower Incisors. Seventh to Eighth Months of age.

FIG. 14. — Showing Four Upper Incisors and Two Lower Central Incisors. Ninth to Tenth Months of age.

FIG. 15. — Showing Four Incisors and Two Molars in each Jaw. Twelfth to Fourteenth Months of age.

FIG. 16. — Showing the same as fig. 15, with the addition of Four Eye Teeth. Eighteenth to Twentieth Months of age.

FIG. 17. — Showing the same as fig. 16, with the addition of the Posterior Molars. Two Years to Two and a Half Years of age. (From a drawing by Dr. W. E. Fothergill.)

The permanent teeth are cut in the following order:

First molars	6 years of age
Central incisors	7 ,,
Lateral incisors	8 ,,
Anterior bicuspids	9 ,,
Posterior bicuspids	10 ,,
Canines	11–12 ,,
Second molars	12–13 ,,
Third molars	17–25 ,,

The process of tooth cutting is looked upon by the majority of mothers with something akin to awe, and is held to be accountable for a multitude of childish ailments, great and small. It is a cherished belief among the ignorant classes that an illness of some sort is sure to accompany or precede the appearance of the teeth through the gums, and every imaginable complaint is at one time or another attributed to the teeth. We often hear the expression 'he is plagued with his teeth,' or 'he is cutting his teeth very hard.' If a tooth should come through unnoticed and without any trouble, it is a thing to be remarked upon and remembered. Not long ago a woman who brought her only living child to the Children's Hospital informed us she had lost *eight* children through 'teething'!

There can be little doubt that there is a great deal of exaggeration in all this; dentition is a perfectly natural process, and in a healthy infant the cutting of a tooth does not give rise to anything more than the discomfort of tender gums, and likely enough a disturbed night or two. On the other hand, a tooth is frequently discovered to have come through without having given rise to the slightest discomfort. Let us remember that an infant cuts twenty teeth in

as many months, and as the minor ailments of infancy are numerous and mysterious in their origin—and womankind generally exceedingly anxious to find out the cause of everything—it is only likely that many of these infant troubles will be laid at the door of the teeth. During infancy there is a marked liability to febrile attacks, often without obvious cause. Eczema is common in some children, others have a tendency to bronchitis or intestinal catarrh, and many of these attacks are likely enough to be laid at the door of the teething process. The danger is that in attributing almost every infant ailment to the teeth, some important error in diet, or the presence of some serious disease is overlooked, and thus valuable time and opportunities are thrown away. Every physician will be able to call to mind instances of serious disease, such as meningitis or acute diarrhœa, which in their early stages were attributed to the troubles of teething.

It is a good rule to follow not to attribute any illness such as high fever, bronchitis, convulsions, diarrhœa, &c., to the teeth, unless there is some local redness and swelling or tenderness in the neighbourhood of the tooth which is being cut. Even if it is so the illness may be only coincident. If in any illness the gums and teeth look in a healthy condition, it is necessary to search elsewhere for the cause of the ailment.

Mothers are prone, even in the first few months of life, long before there is any appearance of the edges of the teeth near the surface, to think that the teeth are troubling the infant. But it is very doubtful if this really is so: it is only when the cutting edge of the tooth is beginning to press upwards into the

membrane covering the gums that any discomfort or trouble is likely to arise.

It is very likely that the mucous membrane over the tooth becomes swollen and over sensitive, and consequently tender to the touch ; very likely shooting or pricking pains may be felt, and there is consequently restlessness at night. The local inflammation may cause feverishness, the gums may become 'spongy' looking, and superficial ulcers may form on the gums and spread to other places in the mouth. Sometimes the mouth gets into a completely unhealthy state through ulceration and swelling of the gums, and some swelling of the external glands may take place.

It is possible that under such conditions the infant becomes more sensitive to cold or improper food, and as a result there may be an attack of bronchitis or diarrhœa. In an infant with neurotic tendencies convulsions may take place, or if it is subject to eczema, any partially healed eruption may break out afresh. It is, however, I think, certain that the connection between teething and some of these diseases is not as close as many mothers would have us believe.

The gum lancet has largely gone out of fashion, and doctors do not now carry one in their waistcoat pocket as of yore ; yet there cannot be a doubt that in some cases it is of the greatest service. If a rapidly advancing double tooth is stretching the membrane covering the tooth, an incision through it is certain to bring relief, and the little bleeding which follows helps to relieve the congestion and swelling.

It is of no use cutting the gum over a 'lazy' tooth where there is no tension, as the membrane is only too likely to heal up and close the tooth in, and the process has to be repeated. In one case which I can call to mind the tooth was finally cut exactly one year after the gum over it was lanced; doubtless the delay caused some chagrin to all concerned.

The health of the infant both before and after birth undoubtedly has its effects on the teeth, including the permanent as well as the temporary set. Ill-health interferes with the formation of the enamel of the teeth, and if this is abnormally thin or deficient, 'decay' soon appears and the tooth becomes pitted or 'hollow.' In the worst cases the first teeth are small and ill-formed, they quickly become discoloured and pitted and perish or crumble away. The enamel often becomes eroded at the roots of the teeth near the gums, and decay proceeds rapidly.

Ill-health during infancy, when the teeth are being formed in their sacs, gives rise to an imperfect coating of enamel, and when cut they quickly perish. In the same way some of the permanent teeth may be imperfectly developed if the health has been bad during infancy.

I need hardly say that it is of the greatest importance to take care of the first set of teeth. Children are only too likely to bolt their food, and this is all the more probable if the teeth are carious or decayed and the nerve exposed and tender. The process of mastication is an important one, as not only is the food crushed by the teeth whilst chewing it, but an admixture of saliva takes place, and thus the first

stage of digestion takes place in the mouth. Moreover, the act of mastication gives rise to the pouring out of gastric juice in the stomach.

It is necessary from the first to accustom the child to have its teeth and mouth cleansed daily; this can be done with a small soft tooth-brush or a soft rag attached to a piece of stick for a handle. A little weak Condy's fluid may be used.

The decomposition of the remains of food left in the mouth after a meal is one of the factors in producing decay or 'caries' of the teeth. Hence the necessity of cleansing the mouth, after breakfast and at bedtime being the best times. When the child is old enough to use a tooth-brush and rinse out its mouth, some prepared chalk tooth-powder should be used.[1] The child should be taught to use the brush vertically as well as horizontally, so as to dislodge any food sticking between the teeth. If the teeth show any appearance of decay, a competent dentist should be consulted; this applies to both temporary and permanent set.

[1] *See* Appendix.

CHAPTER VII

NATURAL FEEDING

THE results of breast feeding are so much superior to the results obtained by artificial feeding—in spite of recent advances in modifying cow's milk—that every mother, no matter what her station in life may be, should endeavour in this matter to perform a mother's duties towards her infant. If she is strong enough to nurse her infant for a few weeks or months only, much will be gained, as artificial food is more likely to agree with the infant when three or four months of age than it is with a newly-born infant, and the most difficult period will have been tided over.

There are certain circumstances, however, which either render it impossible or not wise for the mother to attempt the task of feeding her infant at the breast. In some cases no milk is secreted, or the milk appears for a short time and then disappears again. The mother may be completely prostrated by illness following a severe labour, and thus be unfitted to undertake the task. If the mother suffers from, or has a marked tendency to, any hereditary disease she should not attempt to nurse her infant.

Thus no woman who has a tendency to consump-

tion, or who suffers, or has in past times suffered, from epilepsy or other nervous disorders should be allowed to nurse; but if, on the other hand, she is simply delicate there can be no harm in allowing her to make the attempt, and her nursing may be supplemented with artificial food as soon as there is evidence that it is necessary.

I often think that monthly nurses who are wanting in experience do much harm by persuading mothers that they are not able to nurse their infants, or that, having made the attempt, they must give it up, whereupon the feeding bottle comes upon the scene. In a matter of this importance the responsibility of deciding the question should rest with the doctor and not with the nurse.

Feeding the infant at the breast.—How soon after labour is over ought the infant to be put to the breast? There is no hurry for a few hours, as it is better to give the mother time to recover herself and to get some sleep and perhaps some nourishment. Two or three hours after labour is over will be soon enough, and indeed a much longer time than this may elapse without harm to the infant. If the infant be put to the breast four times in the first twenty-four hours, and six times in the second, it will be often enough.

There need be no anxiety on the part of the nurse if the baby does not get as much from the breast as it would like during the first day or two; and if there is any necessity the breast supply, if poor, can be supplemented by a few teaspoonfuls of whey or sugar water. It is not wise to give the baby cow's milk, even when diluted, for the first day or two

after birth. There is no necessity to jump to the conclusion that the mother will be unable to nurse the baby because for the first few days the milk does not come very freely. It is important for the infant to be put to the breast, in order to stimulate the flow of milk.

From the very first it is important to accustom the infant to regular times of feeding. After the third day the infant should be put to the breast every two hours during the day, and every four hours during the night, so as to give the mother as much rest as possible.

A healthy newly-born infant empties the breast in ten to fifteen minutes, and during this time draws off perhaps one to two ounces of milk, taking in all some ten to twenty ounces in the twenty-four hours, except during the first two days, when the quantity is usually much less than this.

An infant's stomach at birth is only capable of containing some ounce or ounce and a half of fluid without being distended, and if too much is taken, vomiting or 'possetting' is very likely to take place, so that it is very important for the mother to feed the infant very slowly, extending the time to fifteen or twenty minutes.

Too frequent nursing is bad for the infant, inasmuch as if the stomach is overloaded more food is taken than it can digest; and, moreover, the mother's breasts require rest, the breast milk being altered in composition if drawn too frequently.

The infant's stomach enlarges as time goes on and the secretion of milk becomes freer, and the infant takes more than it did at first.

The following table shows the intervals and number of nursings according to age :—

Age	Intervals during day	Number of night nursings	Total number of nursings in 24 hours
First two days	6–4 hours	1	4–6
First month	2 ,,	2	9
Second and third months . .	2½ ,,	1	8
Third to sixth month . . .	3 ,,	1	7
Sixth to twelfth month . . .	3 ,,	0	6

A great deal of resolution will very likely be required to carry out these rules. The temptation to feed too frequently is often irresistible when the infant is fractious and apparently hungry, and is for the moment soothed by taking the breast. Assuming that the infant is healthy, of normal weight, and that the breast milk comes freely, it is of the greatest importance to adhere to these rules from the first. It is especially necessary to secure for the mother four or five hours continuous sleep at night during the first month, in order to give her a good chance of regaining her strength. A great deal of responsibility rests with the nurse in bringing about this desirable rest, and she should take the greatest pains to try and accustom the infant from the first to sleep for some hours continuously at night. It is at night, when the infant is restless and wakeful, that the temptation to feed too frequently in the hope of quieting it is the greatest, and for this reason, if for no other, it is bad for the infant to sleep with the mother ; there is, moreover, the risk of suffocation if the mother goes to sleep with the infant taking the breast.

Difficulties occurring in nursing infants.—Reference has already been made to the fact that for the first two or three days after labour the secretion of milk is scanty, and this is especially apt to be so in the case of those who are mothers for the first time. It is well, however, to put the infant to the breast at intervals of about every four hours during the day for the first two days, even if it gets little or nothing, for, as mentioned before, the fact of its being put to the breast will help to stimulate the flow of milk. If nothing be obtained from the breast, a few teaspoonfuls at a time of sweetened water may be given at intervals for the first few days. On the third day it is time to begin artificial feeding, if no milk has appeared in the breasts. In exceptional cases, when the infant is lively and hungry, it may be necessary to begin to feed on the second day, but in the majority of cases there is no need for this.

The first milk secreted is called the 'colostrum'; it is richer than the normal milk, and it is of importance that too much of it should not be taken. Nursing at intervals of four hours during the first and second day will be quite enough.

During the first few days the nipples are apt to be sore and tender; care should be taken to bathe them with a warm solution of boric acid (3 per cent.) after the infant has taken the breast, and to wipe them dry, and this may with advantage be continued during the whole of the nursing period.

Assuming that the ordinary rules for nursing infants are carefully observed, and the greatest care taken in every particular, if the infant is not thriving it will probably be found in the majority of cases to

be because either (1) the milk is poor in quality and perhaps scanty, though it may be plentiful; or (2) the milk is too rich and perhaps too abundant.

(1) One of the signs of insufficient nourishment during the first week is a rise in the temperature. It has been shown by Dr. E. Holt, of New York, and other observers in some maternity hospitals, that a rise of temperature to 102° F. or even 104° F. is common in badly nourished infants during the first four or five days. The temperature becomes normal in a few hours on the infant taking the breast or a suitable artificial food.

A healthy infant, after it has taken a full meal of a suitable food, goes to sleep for two or three hours, or at least is in a state of quietude and comparative bliss. If, on the other hand, after being nursed the infant wakes up and whines and cries long before the time of feeding comes, without there being any obvious cause for it, such as indigestion and flatulence, the probabilities are that the breast milk is of poor quality, and very likely also deficient in quantity. If the infant keeps taking the breast for a long time, say half an hour, without being satisfied, or desists in a temper after a short effort, the milk is probably also poor and insufficient. Usually under these circumstances the bowels are constipated and the stools dry, less often they are small, liquid, and frequent. The infant under these circumstances does not gain in weight, or its increase in weight is very small. The normal increase of weight, *i.e.*, four or five ounces a week, is not being maintained.

It is not wise too hurriedly to come to a conclusion that the milk is poor, but if these symptoms continue

during a time in which the infant is being watched by a competent nurse, and is weighed twice a week, a change in the direction of improving the quality or altering the nature of the infant's food will have to be made.

The mother's breasts should be examined, and they will probably be found soft and flabby. It may be well to obtain an ounce of milk from the breasts and have an analysis made by a competent chemist, but several specimens ought to be examined before any conclusion is come to. It may be well in the first place, if the above symptoms are not well marked, to see what can be done to improve the quality of the milk, by giving the mother a richer diet. She should take extra quantities of meat and milk, malt extract and cod-liver oil, and perhaps a moderate amount of alcohol. She should not be allowed to nurse at night, and she should take plenty of fresh air. Perhaps a change into the country if she lives in the city may help to work a change for the better. One or two bottles of artificial food may be given the infant at night so as to allow the mother to sleep. If no improvement takes place nursing must gradually be given up.

(2) It sometimes happens that the milk is too rich and abundant and the infant is not able to digest it properly. In such a case there is vomiting of sour-smelling, partially digested food, and the stools are large and pale, containing quantities of undigested curd or fat. There may be flatulence and colic which disturb the infant's sleep. The mother's breasts possibly are overful, and the milk on analysis may be found of an unnaturally rich quality.

In this case the remedy will probably be found not in weaning, but in reducing the richness of the mother's diet. Less meat should be eaten, all alcohol forbidden, and a large amount of active exercise be taken in the open air. The milk secreted during the first week or ten days is apt to be very rich, and consequently the infant may suffer from vomiting, colic, diarrhœa, with red excoriated skin at the buttocks. When this is the case it is wise to draw the milk from the breasts with a breast pump, dilute with water, and give it to the infant with a spoon or pipette, or the infant may be given some form of artificial food for a few days. As this condition of the breast milk is only temporary, the infant may be put to the breast again later on.

Health of the mother.—During the whole time the infant is being nursed, the health of the mother is of the greatest importance both to herself and to her baby, as it is impossible for a weakly woman, or for one in ill-health, to give good milk. The food which she takes and the life which she leads are of the greatest importance, for anything which causes indigestion in the mother will be extremely likely to affect the breast milk and disturb the infant's digestion.

Various drugs, such as opium or Epsom salts, if taken by the mother, are excreted to some extent at least in the milk, and may thus affect the infant. Any violent emotion such as a great sorrow or a prolonged anxiety experienced by the mother is very likely to alter the quality of the milk, and to cause the infant to suffer. Indeed, some serious trouble, such as the loss of a husband or a child, has been

known to bring about the cessation of the flow of milk and to necessitate the artificial feeding of the infant.

The mother's diet should largely consist of milk porridge (oatmeal or wheatmeal), soups, potatoes, eggs, fish, poultry, beef or mutton in moderation, light puddings, baked and stewed fresh fruit; she should avoid all highly-seasoned foods, pastry, raw fruits and uncooked vegetables. Alcoholic beverages are unnecessary and sometimes harmful, and an excess of tea and coffee should be avoided. Large quantities of beer or other alcoholic beverages taken by the mother have been known to produce serious symptoms in infants at the breast. Exercise in the open air is of the greatest importance, a sedentary life in hot close rooms being very harmful to nursing mothers. If fairly strong she should make up her mind to walk two miles every day, if the weather is at all fit for outdoor exercise.

Wet nurses.—It sometimes happens that it becomes imperative, if an infant's life is to be saved, to secure the services of a wet nurse. The mother may on account of illness be quite unfit to nurse, and the infant may be premature or weakly, and the prospect of its being reared on artificial food very uncertain. Or perhaps an attempt is made to feed the infant artificially, and then serious diarrhœa or convulsions give unmistakable warning that the experiment has failed, and recourse must be had to natural food. Let there be no misunderstanding here. While much has been done of late years to add to our knowledge of the chemistry of milk and the preparation of infant food, no one has as yet

succeeded in really 'humanising' cow's milk and making it into a perfect substitute for the milk designed by Nature for the infant. I have frequently seen infants that have been brought to death's door with indigestion, diarrhœa, or convulsions, while fed on cow's milk or some patent food, improve at once directly a wet nurse has been procured, and the diarrhœa or convulsions disappear as if by magic.

Unfortunately wet nurses of a suitable character are not always ready at hand when required. In towns especially, healthy mothers of healthy infants are seldom to be found who are willing and suitable to undertake the duties of a foster mother. In large cities wet nurses are usually to be obtained at the workhouses, where many women go to be confined, and who are often glad to escape from the monotony of a pauper's life by taking service in a comfortable house at good wages. The difficulty as to former character is apt to crop up, and such women are in consequence never welcome additions to the household. Another difficulty is apt to present itself with regard to the nurse's own child, for while she is performing her duties towards her foster infant her own child is put out to nurse, and deprived not only of its mother's milk but of its mother's care, and is only too likely to be neglected and to go the way that so many 'out-to-nurse' babies have gone before.

A wet nurse should not be above thirty-five or below twenty-one years of age ; very young wet nurses are especially to be avoided.

There is no need for the nurse's own infant to be of the same age as the baby to be nursed ; indeed, it is all the better if the former is older by several

months, for if on inspection the nurse's baby proves to be strong and well, it is pretty good evidence that she is healthy and a good nurse. What is also an important point is that there is less risk to the nurse's child in taking it from the breast and feeding it on the bottle, when it is three months of age or thereabouts, than if it were only a week or two old. In my opinion it is always better to select a wet nurse for a newly-born baby whose own baby is at least three months old. There is of course this to be said, that after she has been nursing her foster baby for three or four months, her milk may fail or become poor, and a change to another nurse may have to be made or artificial food commenced. Still, much will have been gained if the first few months have been tided over before commencing bottle food. Great disparity of age between the proposed nurse's baby and the infant to be nursed, such as five or six months, is of course an objection, but in an emergency such an one may be tried, and emergency cases form a large proportion of our cases in practice.

A medical examination should always be made, both of the proposed nurse and of her baby, before any engagement can be thought of.

The diet of the nurse should be arranged much on the lines already given for the nursing mother. The tendency is to give too much porter and too little work. Regular exercise should be taken by the nurse in the open air, and plenty of household work should be found for her so that her time is well filled up. She should do as little as possible for the infant, as far as the ordinary duties of a nurse are concerned ; the care of the child should be undertaken by the

regular nurse. In some cases, however, it may be possible to obtain a wet nurse who is well acquainted with the duties of a nurse, but such are rarities.

It is perhaps not necessary to say a word as to the responsibility which every employer of a wet nurse incurs in connection with the nurse's own child. Common humanity suggests that it should not be forgotten. In this matter as in many others we can realise the truth of the words, 'Where your duty lies, there your interest lies also.'

Weaning.—How long should a mother continue to nurse her infant? As a general rule seven or eight months is long enough, though exceptionally strong women may go on for a month or two more. After seven or eight months of nursing it is common to find the milk poor in quality, though the amount in the breasts may be as large as ever, and as a result the infant is frequently fat though pale and flabby. The occurrence of menstruation is no bar to the continuance of nursing, though at these times it is not uncommon to find that the infant is not so well as usual. But often long before the end of the seventh or eighth month the question of giving up nursing, or of supplementing the breast milk with other milk arises, on account of the infant not thriving, or because the mother's milk is diminishing, or her health suffering. In every case, unless there is a strong reason to the contrary, such as some great weakness or disease of the mother, the attempt should be made to nurse the infant for at least six weeks or two months. To begin with artificial food at the age of two months, or, better still, four months, is a far easier task than to undertake to feed artificially an infant from

its birth. The risks are far greater in the latter case.

The question of whether to wean or not, especially when this problem has to be faced during the first few months, is often a difficult one, and a false step may lead to a great deal of trouble to the friends and risk to the child. The mother's milk may be poor in quality owing to her not being in robust health, or it may be deficient in quantity. In the former case this can be ascertained by direct analysis by an expert chemist, and moreover the weekly or bi-weekly weighings show that the infant is not gaining weight as it should. If the quantity of milk is diminishing, the breasts will have a soft flabby feel when the nursing time has arrived, and the infant will take half an hour or more to be satisfied, and perhaps will not be satisfied when it has emptied the breast.

Weighing the infant before and after nursing, provided the scales will turn to half-ounces, will give a good idea as to the amount of breast milk the infant takes at a meal.

Weaning should always be done gradually if possible. At first one or two bottles are given in the twenty-four hours, in place of putting the infant to the breast. This may be at night, if convenient, in order to give the mother rest ; then if the new food appears to agree, it may gradually be made to supersede the breast. It is better not to wean during the hottest months of the year, on account of the greater tendency to diarrhœa during those months.

It sometimes happens that there is some difficulty in getting the infant to take the bottle at first, but

with perseverance and a little judicious starvation this can be overcome.

Body weight.—Much interest and importance attaches to the weight of infants, for by periodical weighings we can ascertain if the body growth be satisfactory, and the weight of the infant gives us a better idea than the age as to the amount of food it requires. It must, however, be borne in mind that an infant which increases rapidly in weight is not always a healthy and strong child, as the weight may be due to a disproportionate storage of fat and not to an increase in all the parts of the body.

The weight of an infant at birth is usually from six and a half to seven pounds and a half, but not infrequently one is born weighing eight or nine pounds, while others born prematurely may weigh as little as four pounds and yet survive. Infants have been born weighing as much as eleven or even twelve pounds.

During the first few days after birth there may be a temporary loss of weight (4 to 7 ozs.), then a regular gain commences, and by the eighth or ninth day the initial weight has been made good. In some exceptionally strong children there is no loss but a steady gain from the first. During the first two months there should be a weekly gain of five to six ounces; during the third and fourth months a gain of four to five ounces per week, and during the fifth and sixth months some three to four ounces weekly.

By the end of the first six months the weight is usually double, and by the end of the first year treble, what it was at birth. Growth after the first year is slower, so that the weight is not again doubled

till the end of the sixth year, and is only doubled again by the end of the fourteenth.

The following table shows the monthly gains of nine infants observed by W. Pfeiffer, of Wiesbaden. They were nursed at the breast at first entirely, and later this was supplemented by cow's milk.

WEIGHT AT BIRTH, 7 lbs. 8¼ ozs.

Age	Monthly gain ozs.	Weight at the end of the month lbs. ozs.
First month	13¼	8 5½
Second	30½	10 4
Third	26½	11 15
Fourth	26	13 9¼
Fifth	21	14 14¼
Sixth	21	16 3½
Seventh	17	17 5
Eighth	21	18 10
Ninth	23	20 1
Tenth	20¼	21 5¼
Eleventh	11	22 0
Twelfth	7	22 7

Weighing once a week is often enough. In a healthy infant there is a steady increase of weight; slight variations are not infrequent in consequence of indigestion or diarrhœa (*see* Chart, fig. 3).

CHAPTER VIII

ARTIFICIAL FEEDING OF INFANTS

EVERY living being requires food to enable it to exist, and to repair the wear and tear incident to life. Food is the fuel which maintains the temperature of the body and supplies the energy of the contracting muscle. Over and above all this, food is required to supply the material for the growth of the body, and which in the infant proceeds apace.

If an infant is deprived of food, or what comes to the same thing, is unable to digest its food, it loses flesh, the limbs become softer, the skin falls into wrinkles and folds, until finally, in an extreme case, it is reduced to mere skin and bone. Infants make flesh and lose it far more readily than do adults.

To enable a man to keep in good health his food must be varied. Health cannot be maintained on starch, or sugar, or white of egg, or any one class of food by itself. Moreover, a certain amount of fresh food is required, as we all know how sailors invariably suffer if their diet consists, for any continuous time, of salt provisions or tinned meats.

We find in the same way that infants suffer if for long periods together they are fed entirely on

preserved foods, such as condensed milk, or dried milk preparations.

The following are the essential constituents or principles which a perfect food should contain in various proportions.

1. **Proteids, or nitrogenous foods.**—To this class belong the albumen or white of egg, the curd of milk, the muscles or flesh of animals, the gluten of flour, and the legumen of peas and beans. The chief use of the proteids is to supply materials for the growth of the body and to make good the wear and tear of the body generally. Any excess of proteid food serves to assist in force production.

2. **The hydro-carbons or fats.**—To this class belong cream, butter, fat of meat, cod-liver oil, &c. One of the chief uses of fat is to be burnt in the body, and thus to assist in maintaining the heat of the body, and also to supply muscular energy. It is certain also that it is necessary in some way to the growth of the body. Children do not thrive if the fat in their food is reduced in quantity.

3. **Carbo-hydrates, or starches and sugars.**—These comprise cane sugar, the sugar found in fruit, milk sugar, and the various forms of starch, such as potatoes, bread, &c. These foods are utilised in the body very much after the manner of the fats, yet it is certain that they cannot take the place of fats as far as the growth of the body is concerned. Starch or sugar cannot replace fat in the food of a growing child without producing ill-health.

4. **Inorganic material.**—A certain amount of earthy material must be present in the food, inasmuch as the bones, the brain, and other organs contain

considerable quantities of phosphates of lime, sulphur, soda, magnesia, and iron. It is certain that a child requires these salts in its food if its body is to be strongly built.

5. **Water.**—Water enters largely into the composition of the body, and a large quantity is required for digestion and to make good the losses by perspiration, &c.

These food principles enter into every diet, but we find that the proportion of each differs with the different races of men, according as they inhabit hot or cold climates. Thus the inhabitants of India, China, and other hot countries take little proteid or animal food, but live largely on starches and sugars in the form of rice and fruits ; while the races which inhabit the cooler climates take large quantities of fat and proteid food.

With regard to the infant we have no difficulty in deciding in what proportions these food principles should be present in its diet, inasmuch as Nature has provided a perfect food in the shape of human milk.

In any artificial food which we provide for the infant we take this as the type, and endeavour to imitate it as nearly as possible.

Let us see in what proportion the various types of foods just referred to are present in milk.

The **Proteids** of milk are two in number, namely, the casein or curd, and a small quantity of albumen resembling the albumen of egg. In cow's milk there is very little albumen, nearly all the proteid being curd, but in human milk much of the proteid is in the form of albumen. If rennet be added to milk, the curd which is held in solution is rendered insoluble,

and separates from the fluid part or whey. If allowed to stand, the now insoluble curd settles to the bottom of the whey in white heavy masses.

The **hydro-carbons** are represented by the cream or butter-fat which is present in milk. The white colour of milk is due to the minute globules of fat suspended in it. Milk is, as a matter of fact, an emulsion consisting of a fluid part and an immense number of minute globules of oil floating in it. When milk stands for awhile, the larger particles gradually

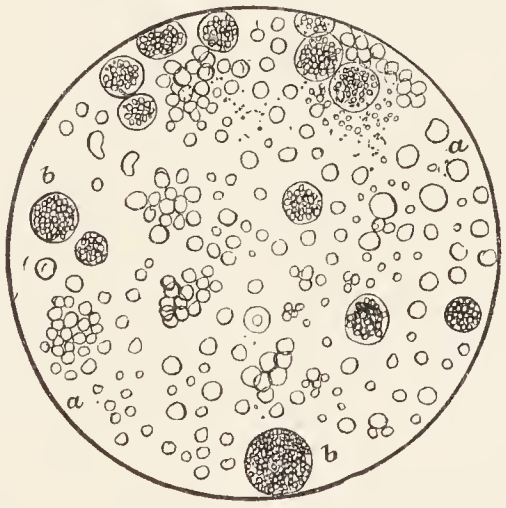


FIG. 18.—Microscopic appearance of human milk, showing 'colostrum corpuscles.' *a*, *a*, milk globules; *b*, *b*, colostrum corpuscles.

rise to the top and form a layer of cream. Churning causes the globules of fat to run together and form butter.

The **carbo-hydrates** are represented by the sugar of milk, which closely resembles other forms of sugar, except that its sweetening power is less. The souring of milk is due to a sort of fermentation in which the sugar is converted into lactic acid. Everyone knows the smell of lactic acid, otherwise the smell of sour milk.

The **earthy salts** are mostly in combination with the curd, and consist of lime, soda, phosphoric acid, and chlorine.

The following table shows the proportions of the different food principles present in an average specimen of the milk of different animals:

—	Proteids	Fat	Sugar	Salts
Human milk . .	1·75	3·5	6	·3
Cow's milk . . .	3·5	3·5	5	·6
Goat's milk . .	3·7	4	4·5	·8
Ass's milk . . .	1·75	1·5	6	·3

In connection with the above table, it must be borne in mind that the richness of milk varies considerably, especially as regards fat, according to the breed of the animal and the food it takes.

Besides cow's milk, the milk of the goat and ass are used in this country. Sheep's milk is used on the Continent to some extent; it is very rich in fat, containing more than twice the amount usually present in cow's milk.

Ass's milk is better adapted than cow's milk for delicate infants, being less rich and more digestible, but it is not readily obtainable, either in the country or in towns. One or two dairy companies in London keep milch asses, and supply their milk to their customers.

Goat's milk differs somewhat from cow's milk in smell and taste, but does not differ from it materially in other respects. There is one advantage derived from the use of goat's milk, and that is that goats do not appear to suffer from tuberculosis, while tuber-

culosis is well-known to be a very common disease in cows.

The usefulness of the goat as an animal for supplying milk has recently been brought prominently before the public of this country through the exertions of the British Goat Society, and the status of a 'dairy animal' has been claimed for it. It has been called with justice the 'poor man's cow,' as it costs far less than a cow to keep, and if carefully fed yields milk of good taste and quality. To anyone living in the country, or where suitable pasturage can be had, it is certainly an advantage to keep a goat for the children, as milk is thus obtained fresh and clean.

While a goat will eat any rubbish, it is important if it is being kept for its milk that it should be well fed. According to Mr. Bryan Hook, Swiss goats pay the best in this climate, while those imported from Malta or South Europe do not yield as good a supply of milk in this country as they do at home.

Cow's milk.—The vast majority of children who have to be artificially fed have to depend upon cow's milk. Unfortunately, *good* cow's milk is not always easily obtained in our large towns, although there is plenty of milk on sale. The infant fed at its mother's breast gets its food supply direct from the mammary gland, and there can be no question as to its purity and freshness; the infant fed with cow's milk is supplied with a food which has travelled perhaps many miles by railway, and it is liable to contamination from many sources and to undergo various changes *en route*. It is probably from twelve to twenty hours old before it is put into the feeding bottle.

We have mostly to take our milk in good faith, trusting that the cows are healthy and have been properly fed, and that the most scrupulous care has been taken with regard to cleanliness in milking and in the conveyance and storage of the milk.

A very little investigation will show that in the winter months the cows are usually fed more with the idea of forcing them to give as large an amount of milk as possible, without any regard for its quality, or suitability for the food of infants. Turnips and brewers' grains are given in large quantities, instead of hay, maize, or other dry fodder, with the result that the milk is poor and watery. The sheds or byres are ill-ventilated and foul, the floors covered with filth in which the animals lie, and as a result their bodies and udders get caked with dried excrement, which, when the animal is milked, is very liable to fall into the milk pail.

Indeed, it is no uncommon thing to find that milk which is supplied to our houses deposits on standing more or less gritty matter and green particles which consist of dried excrement. In the summer months the cows are sometimes pastured in fields which are watered by brooks containing sewage derived from towns, and the cows may not only drink this water, but stand or lie down in it, and in this way their bodies become befouled, and an easy chance is afforded, when the cows are milked, of the dried matters adherent to the animal falling into the milk pail.

We must bear in mind also that cows suffer from various infectious diseases which also affect man. There cannot be the least doubt that tuberculosis,

typhoid fever, and diphtheria have been conveyed by means of milk from the cow or the farmyard to man.

Besides the contamination possible in the farmyard and pastures, there is the risk engendered by dirty cans, and the exposure of milk to the close and polluted atmosphere of small shops and the crowded tenements of the poorer classes.

By means of these various sources of contamination micro-organisms enter the milk, and their entrance marks the commencement of decomposition and other similar changes. These organisms multiply rapidly, the rapidity with which they grow being influenced very much by temperature. At a temperature of blood heat all micro-organisms grow quickly, while at a temperature near the freezing point there is practically no growth.

Stale milk is sour, as everybody knows, and this acid milk quickly curdles, but long before it becomes acid, and when it is only in an incipient stage of decomposition, it is quite unfit for the food of infants. Stale milk quickly curdles into hard lumps in the infant's stomach, and the micro-organisms contained in it continue to flourish in the stomach ; the milk decomposes instead of digesting, and flatulence, vomiting, or colic is the result.

With these facts before us we cannot be too careful in dealing only with honest and respectable milk purveyors or farmers, who make the quality of the milk and not its price the first consideration. Moreover, the greatest care must be taken in storing the milk after it enters the household.

In some of our large cities and towns there are

milk companies or dairy farmers who carry on their business on sanitary lines, and whose milk and cream may be depended on for infant feeding. The first care is concerning the health of the cows. All cows suffering from tuberculosis should be rigorously excluded, the herd being tested from time to time. They should be kept scrupulously clean, like well groomed horses; the sheds should be well supplied with fresh air, cleaned daily and well drained. They should be scientifically fed, all brewers' grains forbidden, and oil-cake given in moderation if at all, the staple food in winter being meal, hay, bran, with some fresh food as beets or mangels. In summer the cows graze in clean pastures consisting of rich clover and grass. Immediately after milking the milk is cooled to a temperature of 40° F., carefully filtered, and delivered to customers in glass bottles. In some dairies the milk is sterilised after filtration, before being sent out.

With regard to the storage of milk in the house, it is of great importance to keep it in a cool place and covered up, to prevent dust and germs from falling in. Temperature, as has already been stated, is a most important factor in the prevention of the souring of milk. Fresh milk kept at blood heat (98° F.) turns sour and curdles in eighteen or nineteen hours; at the temperature of an ordinary kitchen or nursery (65° F.) in about sixty hours; standing in iced water (32° F.) not for three weeks.

Milk should never be kept in the nursery or kitchen, and on no account should the infant's milk be kept warm for hours during the night, but it should be warmed just before being used. Milk for infant's

and children's use is best supplied to the household in bottles. If supplied in cans it should be transferred at once to a clean glass jug and kept in the coolest place in the house, preferably an ice chest. It should be covered with a piece of glass or a clean plate, to prevent dust falling in.

Besides the differences which exist between cow's milk and human milk, already pointed out, there are others which are of considerable importance. Cow's milk contains about two or three times as much proteid as woman's milk and less sugar, while it contains about the same amount of fat. Not only is the proteid more abundant, but it forms a much denser precipitate on curdling than human milk does. Cow's milk, even when diluted, quickly curdles in the stomach, forming lumps of casein which are apt to decompose and pass through the stomach and bowels undigested. Human milk curdles slowly in the stomach, forming light and soft flocculi which readily digest.

The easiest way to prepare an infant's food from cow's milk is to dilute and sweeten it.

In measuring milk and other fluids used in infant feeding, it is best to use graduated glasses marked in fluid ounces ; such measures as tablespoons, gills, &c. are best avoided as likely to lead to confusion. Sugar of milk can be supplied by a chemist in ounce packages, but it is easy to get a chip box or other measure that will hold an ounce weight of sugar, and this will save weighing every time. Spoons should not be used as measures either for fluids or solids when accuracy is necessary.

For the first few weeks of life it will be well to dilute the milk with two-thirds water. The best milk

obtainable should be procured, 'strippings' or 'afterings' being the best.

	ozs.
Fresh milk	5
Sugar of milk	½
Boiling water	10

Dissolve the sugar of milk in the boiling water and add the milk. Cool rapidly, keep in a cool place, and warm up as much as is required when the infant has to be fed. Make up fresh daily.

After the first few weeks, if the infant is thriving and digesting its food well, and passing no curdy masses in its stools, a stronger food may be given. The milk may be given half and half.

	ozs.
Fresh milk	15
Sugar of milk	1
Boiling water	15

After three or four months, if all is going on well, the proportion of milk in the food may be still more increased. A good ordinary milk should be selected, as strippings would be too strong and rich if the milk is only going to be diluted with one-third or one-fourth of water.

	ozs.
Fresh milk	30
Sugar of milk	1½
Boiling water	10

As cow's milk is apt to be slightly acid, especially if some hours old, it is always as well to add a small quantity of an alkali to the infant's food. Bicarbonate of soda is as good as any; a small quantity, say half a measured drachm, may be added to the food when first prepared. Lime water is often used for this purpose in the proportion of about one-twelfth of the

mixture. Only enough alkali should be added to secure that the food is alkaline.

Instead of using water to dilute the milk, whey, barley water, or oatmeal water may be used. It is a good plan too, especially if the bowels are constipated, to add a teaspoonful of malt extract to each bottle of food just before it is warmed up for the infant's meal.

Ordinary cane sugar may be substituted for sugar of milk when expense has to be considered. A sufficient quantity may be added to render the food slightly sweet.

The weak point of the food if prepared in the above way is that unless 'afterings' are used the food will be deficient in fat. 'Strippings' cannot always be obtained, and are apt to vary very much in richness; they should contain at least six to seven per cent. of fat. But if the milk to be diluted is poor or only an average one, the resulting food will certainly be deficient in fat. For this reason it is better to prepare a 'cream' mixture or to 'humanise' the milk, as it is sometimes called.

'Humanised milk,' 'modified milk,' 'cream mixtures.'—I have just said that while to dilute milk is the readiest way of preparing a milk food for an infant, yet it is not the best, as the resulting mixture is deficient in fat, and a full proportion of fat is most important for the well being of the infant. A deficiency in fat is not unlikely to give rise to rickets. In order to make up this deficiency fresh cream may be added, or cream may be diluted with a solution of sugar of milk. A difficulty, however, occurs in obtaining a cream of definite strength and

absolutely fresh and sweet. If cream which is stale or too rich be used, it is likely to give rise to vomiting. Do not use the preserved cream sold in pots, as it often contains boracic acid or other preservatives.

The easiest way to prepare 'humanised milk' in the household—that is, a milk closely resembling human milk as far as the percentage of its constituents go—is to allow cow's milk to stand for some hours and use the upper portion only for making the infant's food. The first thing is to secure good fresh milk; the nearer the farm the better, as the sooner after milking the milk is put to cream the more readily does the latter rise. Milk twelve or more hours old does not cream well.

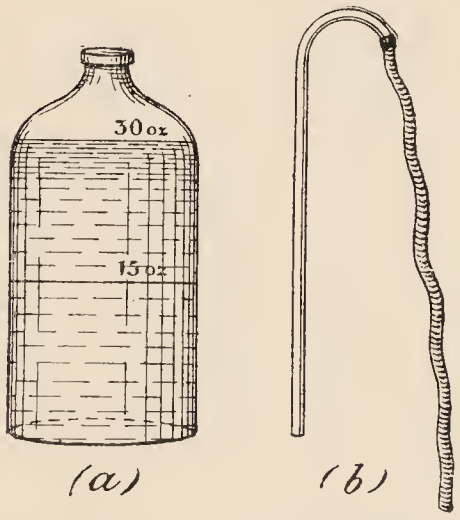


FIG. 19.—(*a*) 30 oz. glass bottle containing milk; some cream has risen to the top after standing some hours. (*b*) Glass siphon with india-rubber tube attached for drawing off the lower half of the milk.

A 30 oz. bottle, such as is supplied with Hawksley's No. 1 Steriliser (*see* figs. 19 and 21), answers very well for setting the milk to cream. Thirty ounces of milk are placed in the bottle, and the mouth is plugged with cotton wool to exclude dust. The bottle is then put into a cool place out of doors in winter, and in running water, or better still in iced water, in the summer. An ice chest or refrigerator is very useful for the purpose. Let it stand undisturbed for six hours. At the end of this time a layer of cream equivalent to one-tenth of the bulk of milk will have risen to the top if the

milk is of good quality. *Then, without disturbing the milk*, siphon off the lower half, *i.e.*, 15 ozs., and replace this by 15 ozs. of sugar water (dissolve 1 oz. of milk sugar in 15 ozs. of water), thus making 30 ozs. of food. The siphon removes the lower part of the milk which contains any deposited dirt, and leaves the upper or creamy part.

If a weaker food is necessary to meet the requirements of a very young or weakly infant, siphon off 20 ozs. of milk and replace by adding 20 ozs. of sugar water (1 oz. of milk sugar in 20 ozs. of water), thus making 30 ozs. of food. After the food is made, half a drachm of pure bicarbonate of soda, or the same quantity of saccharated solution of lime, may be added. The food is then to be 'pasteurised' or sterilised for half an hour. It is of great importance to cool the food as rapidly as possible after sterilisation, by placing the bottle in running water, or, better still, in ice and water. Keep it in a cool place and warm up the food just before it is used.

Another way to make humanised milk for an infant is to allow a *quart* of good milk to stand in a tall covered glass jar for twelve hours, surrounded by iced or running water. Remove 6 ozs. of cream by careful skimming. Then, if a weak food suitable for a young or delicate infant be required, make according to Formula I.; for an infant of four months of ordinary digestive powers according to Formula II.

FORMULA I.

	ozs.		ozs.
Cream	6	or	4
Fresh milk	3	or	2
Lime water	3	or	2
Milk sugar	2	or	$1\frac{1}{2}$
Boiling water	22	or	15
	36	or	24

FORMULA II.

	ozs.
Cream	6
Fresh milk	12
Lime water	2
Milk sugar	2
Boiling water	18
	40

Sterilise or pasteurise, cool quickly and keep in the cold.

Amount of food to be given.—It is obviously just as important to regulate the amount of food taken as it is to determine the quality of the food. The dangers of over-feeding are far greater when the infant is given the bottle than when it takes the breast. If too much food is given, the digestive apparatus is overtasked, and a certain amount of the food passes through the bowels more or less undigested. Very probably, sooner or later, some of the surplus quantity of food decomposes or ferments, and an attack of vomiting or flatulent diarrhœa is set up. Presently the decomposing matters are ejected and the infant is better.

Neither the infant's age nor its weight must be taken blindly to settle the question as to how much food is to be given. An infant of six months, to take an extreme case, may only weigh some seven or eight pounds if it has suffered much from indigestion or been neglected ; on the other hand, if weight alone is taken as our guide, very fat babies weighing much above the average will certainly be overfed if we take the weight as our guide. In the table below both ages and average weight are given ; for thin babies the weight is the best guide, while for fat babies the age, or a mean may be taken between the two.

TABLE SHOWING AMOUNTS OF FOOD TO BE TAKEN DURING FIRST YEAR

Age	Weight	Amount at a meal	Number of meals in 24 hours	Total quantity in 24 hours
	lbs.	ozs.		ozs.
Birth to 6 weeks . . .	6–8	1–2	10–9	10–20
6 weeks to 3 months . .	8–11	3–4	8	24–30
3 months to 6 months .	11–14	4–5	7	28–36
6 months to 9 months .	14–16	6–7	6	36–42
9 months to 12 months .	16–21	8–9	5	40–45

Intervals between the feedings.—For the first three months of life a bottle should be given every two hours at first, and later every two hours and a half during the day. One or two bottles will have to be given between ten at night and six in the morning. The infant should sleep the rest of the night.

During the fourth, fifth, and sixth months the time should be extended to every three hours during the day, and one bottle at night should suffice.

After the end of the sixth month, a bottle every three or three and a half hours should be given during the daytime. The infant should sleep all night without any feeding, that is, from ten at night till six or seven in the morning.

Temperature of the food.—The baby's food should be warmed up just before its meal time. Care must be taken not to give it too hot. The nurse should put the bottle against her own cheek, in order to feel that it is only pleasantly warm. Never on any account allow a nurse to put the teat of the bottle in her own mouth in order to taste the food, as disease may be easily communicated in this way from the nurse to the infant. Some feeding bottles

have a thermometer fixed in the side, but they are not to be recommended, as they easily break and the mercury is spilt on the nursery floor. All infant feeding bottles should be able to stand boiling in order to thoroughly cleanse them.

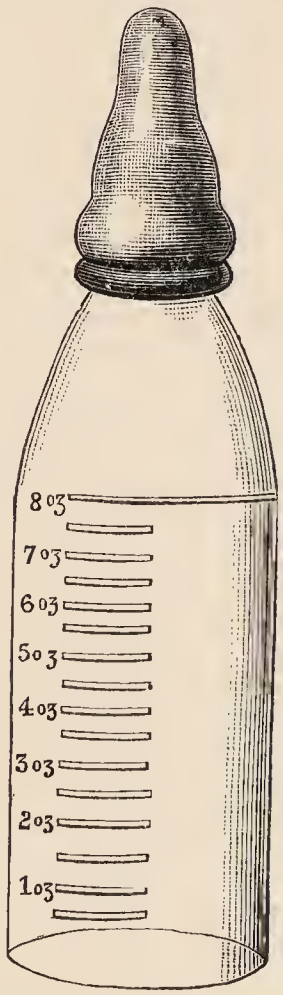


FIG. 20.—Graduated Feeding Bottle, with large mouth and teat.

Feeding bottles.—The simpler the feeding bottle is the better; the fewer parts it has the easier it is to be kept clean. Avoid all bottles with corks, india-rubber tubes, or thermometers fixed to them. The best bottle is one which will stand upright, can easily be cleaned with a bottle brush, and will stand being boiled. The bottle should be graduated in ounces and half ounces. The teat should be wide enough to enable the nurse to turn it inside out and brush it with a tooth brush. When the teat is new a cross cut × should be made in it to allow of its drawing well. When the infant is being fed, the bottle is held in a horizontal position with the teat in the infant's mouth.

CHAPTER IX

ARTIFICIAL FEEDING OF INFANTS (*continued*)

Sterilisation of milk.—I have already referred to the importance of sterilising our milk before using it in the household, or, in other words, destroying by means of heat all the micro-organisms which it contains; but it is needless to say that sterilising will not turn impure milk into good milk, or render stale milk fit for food. The easiest way to sterilise is to boil or scald the milk in an enamelled saucepan over the fire, but there is always a risk of burning it, and boiling milk froths up very readily. It is better to use some form of steriliser in which the milk is surrounded by steam or hot water. Hawksley's milk steriliser is convenient for this purpose, as it is provided with a thermometer, and the process of sterilising can be carried out with exactness (*see* fig. 21). This apparatus consists of an outer tin vessel, provided with a lid and thermometer, and a 30 oz. bottle which fits inside. The bottle is filled with milk, a plug of cotton wool put into the neck as a stopper, then water is poured into the tin to the same height as the milk in the bottle, and the apparatus heated over a gas stove or slow fire. The sterilising process can be completed at a temperature of 160° F., or at a tem-

perature of 212° F. In any case it is wise to maintain the heat for half an hour, to make sure that the sterilisation is complete. At the lower temperature of 160° F., most if not all of the bacteria present are destroyed, but not their spores, but this is of no con-

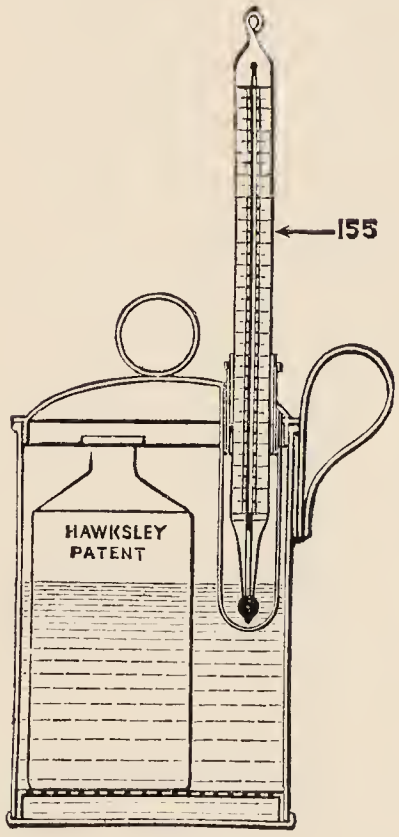


FIG. 21.—Hawksley's No. 1 Steriliser, containinga 30-oz. bottle and provided with a thermometer.

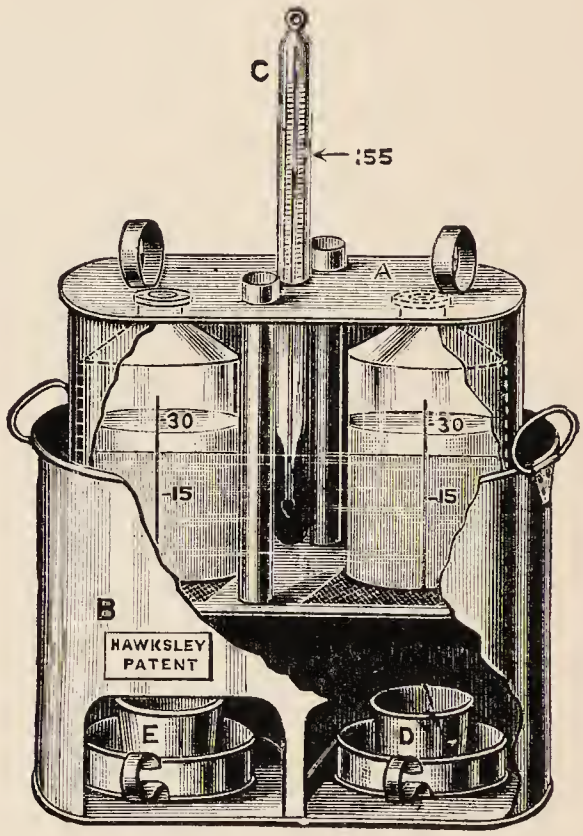


FIG. 22.—Hawksley's No. 2 Steriliser, consisting of an inside vessel for two bottles surrounded with water A, an outside vessel B, a thermometer C, and two spirit lamps D and E.

sequence if it is only intended to keep the milk for twenty-four hours.

A temperature of 160° F. does not coagulate the albumen or alter the taste of the milk to any extent. At a temperature of 212° F. the taste of the milk is altered, the albumen is coagulated and some of the cream is converted into butter, but the

long heating of the milk alters the curd to some extent, rendering it softer and more digestible. For delicate infants the higher temperature is preferable. A steriliser with two bottles is often convenient (*see* fig. 22).

Soxhlet's steriliser is also a good one, and is largely used on the Continent. It consists of a tin receptacle holding ten bottles which contain the milk to be sterilised. Water is placed in the tin, the apparatus is placed on a fire, and the milk in the bottles thoroughly steamed for half an hour.

Freeman's steriliser is much used in the United States, and is very efficient for the purpose and easy to use.

After the sterilising process is complete, the milk should be quickly cooled down by placing the bottles in cold water, and the sterilised milk kept in a cool place.

Instead of domestic sterilisation, milk may be obtained ready sterilised in many of our large towns. It is always preferable to use sterilised milk within a few days, and not to use milk which has been long in stock.

Pancreatised or peptonised milk.—To pancreatise milk is to partially digest the curd of milk before it is taken, and therefore to save the stomach a certain amount of its work. It is a useful expedient in the preparation of food for infants of delicate digestion. To pancreatise milk some of 'Benger's' food or Fairchild's pancreatising powder must be obtained. 'Peptogenic milk powders' contain sugar of milk as well as pancreatising powders. A convenient method is to use Hawksley's steriliser for the

purpose (*see* p. 98). A cream mixture may be prepared as already described; it is then heated to a temperature of 120° F., and a pancreatising powder or some of Benger's food is stirred into the mixture. The mixture is allowed to stand in a warm place for ten to twenty minutes, and then rapidly heated to 200° F. The digestion of the curd proceeds rapidly at a temperature of between 120° and 140° F., but ceases entirely before the temperature reaches 200° F. The mixture is allowed to cool and then kept in a cool place.

If the pancreatising action is allowed to proceed for too great a length of time the milk is rendered bitter, and it is likely that the infant may refuse to take it.

It is not wise to keep an infant for months together on pancreatised milk, as scurvy is apt to arise; and, moreover, an infant's stomach should be able to do its own peptonising, and not have this function performed for it artificially for long periods.

Condensed milk.—Condensed milk has long been a favourite substitute for mother's milk among the poorer classes, but it is also used a good deal for infant feeding among the well-to-do classes. It no doubt owes its popularity to the fact that it is convenient to use, that it does not readily turn sour, and that it is less likely to give rise to vomiting and flatulence than so-called fresh milk. It has been efficiently sterilised in the manufacture, and consequently there is a freedom from risk as far as the communication of tuberculosis from the cow to the infant is concerned. On the other hand, it has been urged against it that the ordinary variety contains a

large percentage of cane sugar added to preserve it, and that when diluted with water in due proportion the resulting mixture will be very deficient in fat as compared with human milk. In other words, as compared with human milk, cane sugar is substituted for fat. As a result the infants so fed are apt to be fat, but their blood is thin and their muscles and bones poorly developed.

While no doubt there is truth in this, and also that there is the risk of scurvy, especially after the sixth month of life, yet I do not doubt that a good condensed milk is better and more wholesome for the infant than much of the so-called fresh milk which is retailed to the poorer classes in our large cities; and it is a useful substitute for fresh milk when, as often happens in summer, the milk supplied is swarming with micro-organisms. It is of great importance to see that the condensed milk used for the infant's food is made from whole milk and not from milk which has been robbed of its cream. Some of the brands sold by grocers and others at a cheap rate is simply condensed skimmed milk, while half of its bulk consists of sugar which has been added, and is quite unfit to nourish an infant. Condensed milk should contain at least 12 per cent. of milk fat.

In measuring the condensed milk for infant's food, the spoon should not be dipped into the tin and a piled up spoonful taken, but the milk should be poured out of the tin into a graduated glass measure. The strength is of great importance; it will, of course, vary with the age and condition of the infant, one part of the ordinary sweetened condensed milk to sixteen of water being the weakest, and one of the

milk to eight of water being the strongest mixture. To avoid giving stale milk a fresh tin should be opened every day. It must not be forgotten that a tin may have been imperfectly sealed, and as a consequence its contents will be bad.

Unsweetened condensed milk is also to be had. The unsweetened variety is not so concentrated as the sweetened condensed milk. Three-fourths or two-thirds of the water is driven off, and the residue is sealed up hermetically without the addition of sugar. In some cases cream is added before sealing up. This form is the best kind of condensed milk for infant feeding.

Dried milk foods.—Several different makes of infant's foods are to be obtained which consist of dried milk with or without the addition of malt or malt extract. Allen and Hanbury's 'No. 1' and 'No. 2' infant's food are good specimens of this class, and so also is Horlick's malted milk. The casein of these dried milk foods is more easily digested than the casein of fresh milk, and it is less likely to undergo decomposition in the stomach and bowels. Care should be taken in the preparation of these foods to get the right proportion of the food to the water. It is not possible to be as accurate in measuring dry foods as in measuring fluids. If Allen and Hanbury's 'No. 1' food be taken, ½ oz. of the food (six measured drachms) should be mixed with water, so that the prepared food should measure 4 ozs. in all. These foods are useful (especially as a temporary resort) when an infant cannot digest any form of fresh milk. On the other hand, I should not be inclined to keep an infant for many weeks or months together on

any dried or preserved food, but should endeavour to get it to take some form of fresh milk, Dried foods are mostly deficient in fat, and the lime salts of the milk which have been deposited in the drying process are not readily taken up by the water added in preparing the food. *If these dried foods are continued for weeks or months together, especially for an infant over 6 months, scurvy will probably be produced.*

Whey.—Whey forms a very useful form of food to be used as a temporary resort, when the infant's digestion is at a low ebb. It is useful also to mix with cream or milk instead of barley water or solution of sugar of milk ; one part of cream made according to directions given (p. 93) mixed with seven parts of whey (sterilised) makes a weak food, while one part of cream with five parts of whey makes a good food for infants of stronger digestive powers.

Whenever it is found that an infant fed with cow's milk is vomiting curd of milk or passing curdy or loose stools, it is a useful expedient to substitute whey for the diluted milk. Great care must be taken in making the whey, and a sweet (not a salt) rennet should be used. The curd should be well broken up with a fork, and the whey with as much of the fat as possible strained through a boiled piece of linen.[1]

[1] *See* Appendix.

CHAPTER X

DIETS

Diet from the sixth to the twelfth month.—If the infant is still being nursed at the breast, it is probable that some additional nourishment will be required after the seventh or eighth month, but this will of course depend upon the mother's health and on the condition of the infant. In most cases it becomes necessary to give some diluted cow's milk in addition to the breast.

Most infants when six or seven months of age will thrive on cow's milk, with the addition of one-third or one-fourth its bulk of some thin gruel made of barley meal, oatmeal, corn flour, or biscuit powder. It is a good plan to allow milk to stand in a bottle, as described on page 92, for six hours, then to remove the lower third and replace with a thin gruel made by well boiling oatmeal in water ; some sugar is added and the mixture pasteurised.

From six to nine months of age six bottles may be given in the twenty-four hours, each containing six or seven ounces of food, thirty-six to forty ounces being given in all.

The first bottle should be given at 7 A.M., the second at 10 A.M., the third at 1 P.M., the fourth at

4 P.M., the fifth at 7 P.M., the sixth at 10 P.M. The infant should sleep from 10 P.M. till 6 A.M.; it should also have two good sleeps in the daytime between meals.

From the ninth to the twelfth months, five meals a day will usually be enough, the amount being eight ounces at each meal, or perhaps a little more, so that forty to forty-six ounces are taken in the twenty-four hours.

The first meal is taken at 7 A.M., the second at 10.30 A.M., the third at 1.30 P.M., the fourth at 5 P.M., and the fifth at 8 P.M.

Mothers are apt to give more milk than the infant can digest, or it may be in some cases without diluting it, and as a result the infant suffers from flatulence, and large pasty stools are passed consisting of decomposing curd. On the other hand, they may err in making the food too thick by adding large quantities of some farinaceous food, such as corn flour or Neave's food. Children fed in this way are apt to be pale and fat, and very often suffer from rickets.

During this period all peptonised foods, dried milk foods, or condensed milk should be avoided, except as very temporary resorts, or scurvy is exceedingly likely to result. A purple discoloration of the gum around a tooth which is being cut is an almost certain sign of scurvy.

Diet from twelve to eighteen months.—At twelve months of age the feeding bottle should be dispensed with, the child being fed with a spoon, or it may drink out of a cup. It is best to make the change gradually; indeed, most children are slow in learning to

drink from a cup, as at first they drink too quickly, with the result that there is some choking or difficulty in swallowing. As a matter of fact, many children of eighteen months may be seen with a bottle, but this is wrong. For with a little patience and firmness there is rarely any difficulty in changing the bottle for the spoon or cup.

The staple food during the second year is milk, but it is varied with porridge, thin milk puddings, eggs broth, fish, chicken, beef, mutton, and cooked fruits. The tendency of mothers and nurses is to give solid or thick food in too large quantities. Bread and butter is often given too freely before the child has learned to masticate.

The meals may be arranged as follows :

First meal, 7.30 A.M.—A breakfast cup (8 to 10 ozs.) of thin hominy, or oatmeal porridge, or gruel, two-thirds of it being milk. Bread and milk may be given as a change.

Second meal, 10.30 A.M.—A cup of milk diluted with barley water or lime water.

Third meal, 1.30 P.M.—Beef tea, mutton broth, chicken tea, thickened with bread crumbs or a little finely sieved potato, or some thin rice pudding with the pulp of a well roasted apple, or the pulp of stewed prunes.

Fourth meal, 5 P.M.—The same as breakfast, varying the cereal with which the milk is thickened. Rusks or fine bread crumbs may be used.

Fifth meal, 9 P.M.—A drink of warm milk with lime water or barley water.

Diet from eighteen months to three years.—After eighteen months of age, when healthy children

have cut their first set of molar teeth, small quantities of fish, fowl or flesh may be allowed. Plaice, sole or cod, boiled or stewed, and carefully freed from all the bones, are the safest kinds of fish, and most wholesome; they are readily taken by most children, but no rich sauce or melted butter should be given. Potatoes mashed with milk may be added. Soups made in various ways from meat and fresh vegetables form an exceedingly wholesome and digestible meal. The meat should be of the best quality, and for young children both the meat and vegetables should be strained off. Boiled fowl is easily digested and forms a pleasant change, it is at first better than butcher's meat. Of the latter, underdone chops torn to shreds and mixed with bread crumbs or mashed potato are, perhaps, most easily digested. Or some of the red meat may be taken from a hot roast leg of mutton, or from ribs of beef next to the bone, and given finely minced with potatoes. A slackly boiled egg may be given for dinner as a change. Rice, sago or tapioca puddings, stewed apples, or jelly made from other fruits may be allowed. All forms of pastry and suet and other fancy puddings are bad.

Children, especially when they are not well, are strangely fastidious in their tastes, and will frequently take a dislike to the more wholesome forms of food. Sometimes they refuse all forms of meat, more often they loathe fat of any kind, or they get tired of their morning porridge and long for more savoury food. While it is well to introduce a variety in their diet, it is a great mistake to indulge them with rich and tasty kinds of food, especially at breakfast or tea. The greatest difficulty comes in when they are

allowed to sit at the parents' tables, or are brought down to the dining-room after their nursery meal, and too often are encouraged to supplement the latter with the more tasty dishes from the parents' dinner table.

Especial stress must be laid on accustoming the child to eat slowly and to masticate its food. All forms of meat should be shredded, that is, cut or torn up with a knife and fork or put through a mincing machine. Meat, especially if over-cooked and hard, is likely to escape digestion and pass through the system.

All through childhood it is of the greatest importance to feed children only at meal times, and not give them biscuits, sweets, gingerbread at any hour simply because they ask for them. The stomach requires rest like every other organ, and cannot get on without it; it is certain to be in an unhealthy condition if it is called on to work at all sorts of times and seasons.

Neither is it wise at meals to try and force a child to take more than it wants, simply because it has not finished up its usual plate of porridge or bread and milk. If it leaves its porridge because it thinks it is going to get something more toothsome from the parents' breakfast table, it will be the height of folly to satisfy its wishes. A little judicious starvation will do no harm, and perhaps a much needed lesson will have been given.

The meals may be arranged as follows:

First meal, 8 A.M.—A breakfast cupful of bread and milk, or porridge made with oatmeal, wheat or maize. After this, the yolk of a slackly boiled egg,

or bread dipped in bacon dripping, with milk to drink.

Second meal, 12.30 P.M. –Fish, chicken or butcher's meat cut up very finely, followed by rice or other milk pudding, with baked or stewed apple. Water to drink.

Third meal, 4.30 P.M.—Bread and butter with some stewed fruit or a well made jam. Sponge cakes, plain cakes with sultana raisins may be allowed at times. A cup of milk.

Fourth meal, 6.30 P.M.—A drink of milk.

Some further remarks on children's diet.

Milk.—This should form the staple food all through childhood. It forms an important part of both breakfast and tea. It should always be boiled or sterilised. Fresh cream is also of great value, but must not be taken in excessive quantities. It is safest to prepare it at home, by allowing milk to stand over night. The thick clotted cream bought in shops should not be used by children. Cream may be given with mashed potatoes, in soups or with stewed fruits.

Cocoa.—Cocoa made with water and milk or cream added may be given for breakfast or tea as a change from milk. Fry's malted cocoa is good.

Eggs.—Fresh eggs slackly boiled or poached are eagerly taken by most children. One a day is enough, as children soon get tired of them.

Meat.—Beefsteak, mutton chop or roast meat, is given most days at dinner time. Flesh meat should be underdone, that is, be red and containing all the

meat juice. Meat should not be cooked a second time. Chicken, pheasant, partridge, form a pleasant change ; they should, of course, be cooked when fresh. White fish, soles, plaice, whiting, cod, turbot are also good as a change for dinner. Various freshly made broths and soups are also useful. Bacon dripping and small pieces of well-fried bacon fat may be allowed for breakfast from time to time.

Vegetables.--Well boiled or baked potatoes when not new, and mashed with milk or gravy, are wholesome and for the most part eagerly taken by children. Excessive quantities are to be avoided. Of other vegetables well boiled cauliflowers, celery, spinach, are the best. French beans and young green peas may be given in small quantities.

Fruits.—The juice of cooked fruits, orange juice and the pulp of fresh grapes, stewed or baked apples, the pulp of stewed French plums and figs, stewed rhubarb, and bananas may be taken.

Puddings, &c.—Rice, tapioca, sago, semolina puddings, plain custards, oatmeal, hominy, crushed wheat made into porridge are all wholesome.

Bread, cakes, &c.—Bread must be a day old at least. Bread made from seconds flour is preferable to very white bread. Whole-meal bread is very wholesome. Bread and butter ; plain sponge cakes, and biscuits ; fruit jellies, marmalade jellies, golden syrup and chocolates may be given in moderation.

Articles of diet not to be given.

Meats.—Goose, duck, 'high' game, pork, veal, salmon, salt fish, sausages, dried meats, ham, kidneys and liver, all forms of meat pies.

Vegetables.—All raw vegetables such as celery, radishes, cresses, tomatoes. Cooked onions, turnips, carrots must also be avoided.

Bread.—New bread, tea cakes, plum cake, hot rolls and all pastry.

Drinks.—Tea, coffee, and all alcoholic liquids.

Fruits.—Raw apples, pears, plums, nuts, candied or dried fruits.

Diet in Rickets.

The diet in this disease must depend on the infant's age as well as on his powers of digestion. In most cases the digestive powers are impaired to a great extent. Excessive quantities of curd of milk and starches must be avoided. In infants under a year, whey, cream, raw beef juice with thin oatmeal water should be given in suitable amounts. Older children should have raw beef juice, whey, cream, eggs, beef tea with vegetables, stewed fruit or fruit juice, bacon fat, minced chicken or underdone meat, according to age and powers of digestion. Remember that plenty of fresh air is quite as important as a suitable diet.

CHAPTER XI

DIFFICULTIES MET WITH IN CONNECTION WITH FEEDING

Disorders of the mouth in infants.—On examining the mouth of a newly-born infant it will be noted that the mucous membrane lining the mouth is of a dull red colour, and on inserting the finger it will have a dry feel. During crying the dull red colour changes into a purple colour. The upper surface of the tongue in a healthy infant is clean and red, but it becomes white and coated with fur during ill-health. For the first few months there is no secretion of saliva, then a certain amount of secretion takes place, and later the saliva dribbles out of the mouth as it is secreted faster than it can be disposed of by swallowing. This dribbling is popularly supposed to denote that the infant is teething, though dribbling begins some months before any teeth come to the surface of the gums.

Various abnormalities may be seen in the mouth of the newly-born baby. Thus there may be a long fold of skin beneath the tongue which prevents its free action, hence the name 'tongue-tied'; this occasionally requires to be divided by the surgeon, though it is never marked enough to interfere with sucking.

Sometimes small nodules about the size of millet seeds may be seen on the roof of the mouth, but which are of no importance. An inspection may reveal the presence of a 'cleft palate,' or an abnormally high roof to the mouth.

During early infancy flocculi of milk are apt to be retained in the mouth in consequence of the dry state of the mucous membrane and the imperfect control that the infant has over the tongue; these milk remains are apt to decompose, especially if the infant is weakly and its digestion in poor order. Hence the great importance of frequently cleansing the mouth so as to clear away the remains of food left between the teeth and on the gums. This can be done with a small paint brush or soft wet rag, using a solution of borax made by dissolving half a teaspoonful of borax in an ounce of water. A weak solution of Condy's fluid answers very well.

Thrush or **parasitic stomatitis** is an affection which is chiefly seen in infants suffering from chronic indigestion or any wasting disease; it is of frequent occurrence among the badly fed and badly cared for infants reared in our large towns and cities. It is caused by the growth in the mouth of a species of fungus, resembling the 'mould fungus' or 'yeast fungus'; it spreads from one infant to another by the dissemination of its spores or seeds. It is doubtful if the fungus will thrive in the mouth of a healthy infant, and indeed it is rarely seen in infants fed at the breast. Thrush appears in the form of small raised white points or patches, which are often surrounded by redness. These patches are seen on the lining of the mouth, inside the cheeks, on the roof of the mouth or

sides of the tongue; they resemble the flocculi of milk just referred to, but the latter are easily removable with a brush, while the patches of thrush are not. Thrush gives rise to soreness and tenderness of the mouth, the infant cries on taking food and is restless and perhaps feverish.

Ulcers of the mouth.—During the whole of infancy and childhood there is a liability to soreness and tenderness of the mouth, which is due to the formation of small ulcers, or spots where the membrane is abraded; this condition is usually associated with some disturbance of the digestion, or it may be connected with the teething process. Some forms are certainly infectious, the infection being conveyed in the first place, by the milk of cows suffering from 'foot and mouth' disease. This affection may pass directly from one child to another by kissing. The infant is probably fretful and feverish, and it cries on taking its food or on sucking. An examination of the mouth will show a number of shallow ulcers inside the lips, on the tongue or roof of the mouth, accompanied by some redness and often swelling. In some cases there may be small blisters or raised yellowish patches. In other cases the gums are swollen, and a yellowish discharge oozes away. If the gum around a tooth is of a dark red colour, and bleeds easily, it is very probable that the child is suffering from scurvy, or, in other words, from the effects of a deficiency of fresh food in its diet. Enlargement of the glands of the neck are apt to follow ulceration of the mouth.

The simplest and safest local treatment for thrush or ulceration is to cleanse the mouth frequently with weak Condy's fluid, and to apply at frequent intervals

some finely ground borax on a damp camel's-hair brush. Chlorate of potash is a poison which should not be given except under medical direction, and all 'teething powders' are useless and dangerous.

Of the more serious forms of ulceration of the mouth or of inflammation of the tonsils I need not speak, as when they occur medical advice should always be obtained.

The prevention of all forms of soreness of the mouth during infancy depends upon the care which is taken to keep the mouth and teeth clear of decomposing food, as well as to attend in detail to all that concerns the feeding of children. Carelessness with regard to the cleanliness of the teats, tubes, and feeding bottles, is responsible for some of the troubles which occur in connection with the mouth. The dirty teat or 'comfort,' which some infants are continually sucking, is frequently the means of infection, for it is dropped perhaps on the floor, and gets covered with dirt, and is then given back at once to the infant. It can hardly be wondered that infective matters find their way under such circumstances into the mouth.

Digestive disorders.—No infant, whether strong or weak, whether fed at the breast or with the bottle, escapes indigestion in some form or other, and every nurse knows that colic, flatulence, vomiting or diarrhœa, form no inconsiderable part of the troubles of an infant's life. But every one of any experience knows that the infant fed at the breast of a healthy mother escapes these troubles far more than its less fortunate brother who is destined to be supplied with a feeding-bottle; but, at the same time, it is certain that a vast amount of the dyspeptic diseases from

which artificially fed infants suffer, can be avoided by care in the selection of the food and in attending to all the details in its preparation.

All through infancy the digestive apparatus has to do a relatively large amount of work to supply material for the rapid growth which is taking place, as well as to make good the wear and tear incident to life. The wants of the body lead to a craving for food, while the digestive juices are easily exhausted or weakened by overwork, and then the food taken fails to digest, or it ferments and ceases to nourish. All this teaches us what care and judgment is required in feeding an infant with artificial food, so that the food, in quantity and quality, should be suited to the infant's digestive powers. The wish to get a small and weakly baby on quickly, often leads to too much food being given, that is, more than it can digest; then it is thought that the food is not suitable, and instead of diminishing the quantity to suit the infant's digestive powers, a change is made to some other food, and this change is made over and over again. How common this is every doctor and every nurse of experience knows. We must also bear in mind that infants differ in their digestive powers in the same way as do adults. We all have friends whose digestions are a constant source of envy to us, to whom nothing comes amiss, and who are apparently none the worse for indulgence in every kind of food and drink. And we find, too, that some infants have the happy facility of vomiting or of passing through them any food they are unable to digest. But with most infants it is not so, an error in diet sets up a gastric catarrh or intestinal catarrh,

and time, patience, and starvation is required to get them back to health again.

The commonest cause of indigestion in an infant is overfeeding with some food that is difficult of digestion. Everything may apparently go well at first; the digestive apparatus, like an overdriven horse, manages to do the extra work without complaint, then some further burden is thrust upon it, or there is exposure to cold, and things go suddenly wrong. There is perhaps vomiting, colic, convulsions, or diarrhœa. The vomiting, if continuous, points to the stomach as being chiefly affected; much distension of the abdomen with gas, and loose stools containing undigested food, point to the small intestines as being involved; while straining, passage of small stools containing mucus, and a raw, excoriated condition of skin about the buttocks, suggest that the large or lower bowel is in a condition of catarrh. Sometimes the whole alimentary canal is affected.

Reference may be made more in detail to the commoner symptoms present in disorders of digestion seen in infants.

Flatulence.—With a healthy state of the digestive organs but little gas is given off, but when the digestive juices are weak, or the food difficult of digestion, the latter ferments or decomposes, and during the fermentation large quantities of gases are formed. When the stomach is distended with gas it escapes upwards more readily than when the intestines are inflated, as kinks take place where the bowels double on themselves and prevent the gas from moving about. Nurses speak of the infant having 'bound wind,' meaning that the intestines are

distended with gas, and it does not easily effect its escape. The thinness of the walls of the stomach and bowels during infancy allows of their being greatly distended when gas is given off in considerable quantities, and in chronic cases of indigestion a permanent dilatation of the stomach may take place.

Distension of the stomach and bowels with gas gives rise to much discomfort, and often acute pain. The infant is restless, cries frequently or almost incessantly, especially at night, and it is with difficulty hushed off to sleep, and then perhaps it wakes up again in a few minutes. The abdomen is distended and more or less tight, and from time to time the infant parts with gas, especially if the stomach and lower bowel are the affected parts. Pressure of the hand or gently rubbing the abdomen gives relief. The remedy is to be found, in most cases, in diminishing the amount of food that the infant is taking.

If the infant is breast fed and suffers from flatulence, it is probably being put to the breast too often, or perhaps the mother is not sufficiently careful of her diet, or she is taking too little exercise. In artificially fed children less food should be given, and it may be well to give one or two meals of barley water instead of its ordinary food. The most urgent symptoms may usually be relieved, if the stomach is chiefly at fault, by dissolving a quarter or half a 'soda-mint' tabloid in sugar water and giving it to the infant, or a tabloid containing a drop or two of tincture of ginger.

When the intestines are distended a laxative is advisable, such as half a tabloid or pellet containing rhubarb, magnesia, and mint or ginger. Enemata of

warm water are often useful in the most troublesome cases.

Vomiting.—Infants vomit or regurgitate their food much more readily than do adults. Some babies who are healthy vomit if they are disturbed or moved to any extent after a meal. A fit of coughing will often be accompanied by sickness. The newly born infant's stomach holds less than two ounces, and a small infant's stomach less than this, and if it is over-distended with food, or if gas forms, it is very likely to regurgitate some of the food taken. During digestion the walls of the stomach contract and relax in order to keep the food it contains in motion, and any over-action is likely to force some of its contents back into the mouth. If the infant takes its food too quickly it is apt to over-fill its stomach, and consequently more likely to vomit than when it feeds more slowly, as, in the latter case, a portion of the food has time to be absorbed before the meal is finished.

The commonest form of vomiting is what is known to mothers as 'possetting'; this consists in the return of a small quantity of fluid from the stomach to the mouth, the regurgitated food escaping from the corners of the mouth. Some babies constantly do this after meals, and their bibs and garments are in a continual state of wet. This possetting is in most cases of not much importance, and indeed may be beneficial, as perhaps the infant habitually takes too much. In these cases the infant thrives in spite of it, and its weekly weighing shows it is gaining weight, as it should be doing. In the more serious forms of vomiting, which are due to gastric catarrh, and with it

an irritable condition of the stomach, the food is retained for some time, then there is retching, and the food is rejected with some force ; the vomit is very sour smelling, and contains masses of hard curd. This is especially the case if the infant is taking fresh cow's milk. In such there is no doubt a condition of indigestion, something goes wrong with the digestive process, and irritating substances are formed which the stomach rejects.

If the vomiting persists, the infant loses weight or at least stands still. Chronic vomiting going on day after day, and continuous loss of weight, always betoken a more or less serious state of affairs, and the younger the infant the more serious it is.

Vomiting in the breast fed infant is in most cases due to the infant taking too much, and taking it too quickly. If the vomiting persists, in spite of the mother regulating the flow of milk through the nipples, so that the infant takes about fifteen minutes over its meal, it will be as well to feed it for awhile on breast milk drawn off by the breast pump and diluted with lime water or barley water. It is rarely advisable to wean in these cases, unless the state of the mother imperatively calls for it.

Vomiting in the artificially fed infant is a much more troublesome affair than vomiting in those which are breast fed. Some cases are especially tiresome, and the tendency to vomit may remain throughout the whole of infancy, in spite of many changes of food. If, however, the infant goes on gaining weight in spite of its vomiting habits there need be no great anxiety.

If the vomiting is slight, it may be sufficient to

further dilute the cow's milk or cream mixture the child is having, taking care at the same time not to increase the amount of sugar. Lime water or barley water may be used as the diluent. In these cases of chronic vomiting it seems to be the curd of milk which presents the difficulty ; the curd decomposes, and a sort of fermentation goes on in the stomach. Peptonising the milk, using Benger's food, or some peptonising powder, is one of the most useful resorts in vomiting; as food, so prepared, often keeps down better than any other form. Sometimes it is better to give whey as the sole food for a day or two. It must, however, never be forgotten that the food, whatever it is, must be taken slowly, and in small amounts at a time.

Diarrhœa—Looseness of Bowels.—Reference has already been made to the character of the stools during early infancy. They are semi-solid, bright yellow, sticky and homogeneous, and a stool is passed two or three times in the twenty-four hours. If stools are passed oftener than this, they are very likely to contain small flocculi of milk. During the first few days after birth the stools are green and semi-solid ; this is the meconium or bile which has accumulated in the intestines during intra-uterine life ; by the end of the first week all the meconium is expelled, and the bright yellow stools make their appearance. During the first few weeks the infant is apt to suffer from more or less looseness of the bowels in consequence of the first milk secreted by the mother being richer (colostrum) than it is later, and prone to purge.

Infants artificially fed are far more likely to suffer from diarrhœa than are those fed at the breast, and this is especially so during the hot summer weather.

This is not difficult to account for. The infant at the breast receives a food which is fresh and free from organisms ; moreover, it is digestible and nourishing. The artificially fed baby receives a milk food which is exceedingly likely to be swarming with organisms derived from various sources, as milk foods of all sorts are extremely favourable grounds for organisms to grow in, especially when the temperature of the atmosphere is high. The rapid growth of organisms in milk gives rise to the formation of poisons or toxines, which, when taken into the stomach and bowels, cause vomiting and diarrhœa.

Looseness of the bowels may be due to a chill, such, for instance, as might be caused by the child being taken out on a very cold day. The presence of undigested food in the bowels may give rise to looseness, liquid stools containing undigested food being passed.

In an ordinary attack of diarrhœa the infant is restless, feverish, and thirsty, and in many case vomits. Sometimes the vomiting is very troublesome for a day or two, and this is especially the case with summer diarrhœa. The abdomen is usually distended in consequence of the accumulation of gas in the small intestines, and the infant passes a number of liquid stools in quick succession, perhaps several in the course of an hour. The first stools passed are copious, liquid, yellow and frothy, and contain more or less of curd. Later, perhaps, the stools are green or dark brown, and contain a large amount of mucus. If this goes on for a day or two, the skin around the anus becomes red and excoriated in consequence of the contact of the damp napkins, and, moreover, the stools are very

irritating to the skin. Before long the legs and thighs become distinctly soft and flabby, while the skin hangs in soft folds. Usually in the course of a few days or a week an improvement takes place, the stools become fewer and the excoriation quickly improves.

It is needless to say that in summer, especially in very hot weather, attacks of diarrhœa are much more serious than the attack just described. There is great depression from the first, and death may take place in a few hours, or in a day or two.

Whenever diarrhœa appears in an artificially fed infant, the question of diet becomes at once the most important part of the treatment. The amount of milk taken must be lessened, and in severe attacks stopped altogether. If milk is continued, sterilised milk or a dried milk food is preferable to fresh milk. Instead of milk, veal tea with barley water, or sterilised whey with a small quantity of cream added, should be given as temporary substitutes, or one of the following mixtures may be given:

Arrow-root water	2 oz.
Whey	2 oz.
White sugar	half a teaspoonful

Barley water	10 oz.
White of egg	half an oz.
White sugar	a teaspoonful

The greatest care must be taken in changing the napkins as soon as soiled, and a pad of absorbent cotton-wool or 'Gamgee tissue' should be used as a napkin, or placed inside the ordinary napkin, and at once burnt when soiled. It is well to remember that stools from infants with diarrhœa are infective, and they must be dealt with accordingly.

Constipation.—This is one of the most frequent troubles met with during infancy, and one which it is not always easy to overcome. Both breast fed and bottle fed infants suffer, though the latter by far the most. In healthy infants, the presence of fæces in the lower bowel leads quickly to a reflex action, by which they are expelled; but, in other cases, their presence does not seem to excite to the act of defæcation until perhaps large quantities have accumulated, and these have become hard and lumpy. In most cases of sluggish bowels during infancy a very slight stimulus applied to the rectum, such as inserting a small piece of curd soap, or a few drops of glycerine, or a glycerine suppository, is quickly followed by an emptying of the bowel. In such cases the bowels are healthy, but sluggish, and do not react when fæces are present, waiting to be expelled, but require some extra stimulus which the glycerine or suppository supplies. In some cases of constipation it is evident that it is due, in part at least, to a deficiency of fat in the food; perhaps the milk is poor in fat, or it has been much diluted, and some starchy food added. Curd of milk and starch in excessive quantities tend to constipation, while excess of fat and malted starch or starch sugar tend to relax.

In constipation in a breast fed infant, assuming that the breast milk is normal, gently rubbing the abdomen and the use of glycerine suppositories will generally suffice to overcome it. The nursing mother must take plenty of exercise, and plenty of vegetables in her diet. If her milk is poor in quality, or scanty, one or two bottles of artificial food may be given in addition to the breast.

In bottle fed babies, the remedy is to be sought by increasing the amount of fat or cream in its food; malted starch, such as is to be found in Mellin's Food, answers the same purpose. A half teaspoonful or more of a good malt extract may be put into each bottle of food, or a teaspoonful or two of fluid magnesia, or two or three grains of light carbonate of magnesia, may be used in the same way. Rubbing the abdomen with sweet oil, and glycerine suppositories may also be necessary.

Wasting. Malnutrition.—A very few days' illness in an infant is certain to be accompanied by a diminution of weight, due for the most part to a loss of fat, but the muscles also suffer though in lesser degree. The face is but little affected at first, but there is a marked softness of the thighs and arms, and before long the skin of the thighs falls into wrinkles and folds, showing that there has been a loss of fat from beneath the skin.

The cause of this loss of flesh during infancy is not difficult to understand. The infant is growing fast and storing away a certain amount of its superfluous nutritive material as fat beneath the skin ; but to do this the digestive organs have to be in perfect order and in first-class condition. Ill-health or indigestion at once impairs the efficiency of the digestive organs, and interferes with the preparation and absorption of the nutriment necessary for the wants of the body and to make good the losses incident to life. For the time being the body has to live upon itself, and the first material to be utilised for the purpose is the fat stored beneath the skin. The stored fat and muscles are consumed instead of the food swallowed, while the digestive organs

are for the nonce off work. The younger the infant the more readily does it waste, and the more acutely does it feel anything amiss with its digestive organs.

Continuous vomiting, diarrhœa, indigestion, or fever of any sort, is certain to be accompanied by more or less loss of flesh, and the more serious the ill-health the more marked is the wasting. In a few instances we see infants wasting or losing weight week by week without any very obvious symptoms of ill-health, or any very obtrusive signs of indigestion. The infant takes its food in sufficient quantities, with no vomiting or diarrhœa ; usually, indeed, constipation is present, but no gain in weight takes place, and it is clear that a fault exists somewhere or other, and the system fails to convert the food into material capable of nourishing the body.

These cases are rare in infants nursed at the breast of a healthy mother or wet nurse, but they occur in weakly babies that are artificially fed. In most cases at least there is some weakness of the digestive organs, and the food passes through the alimentary canal without any of it being converted into materials that can be absorbed and utilised by the system for building up the tissues. Sometimes this wasting follows some serious attack of bronchitis or inflammation of the lungs. The infant just manages to survive the inflammatory attack, staggers through, so to speak, but with an exhausted system which has not power to right itself. For after the attack is over it gradually wastes without sign of obvious disease, gets smaller and smaller in spite of the most careful feeding, and finally succumbs. We see the

same thing occurring, perhaps, more frequently after severe attacks of summer diarrhœa. The diarrhœa ceases, the infant seems at first on the highway to recovery, then it begins to fail, a gradual wasting sets in, which ends in death from exhaustion.

Wasting in its extreme form is mostly seen among the infants of the poorest and most ignorant classes of the population of a large city. The common history is that the infant has been brought up from the first on artificial food, or that its mother only nursed it for a few weeks and then gave it the bottle, and forthwith its troubles began. In the majority of such cases there is a history of colic, flatulence, vomiting and diarrhœa. But in a few cases there is constipation. Often the appetite is ravenous, the wants of the system crying out loudly for food, but after taking the bottle greedily, the infant is sick and brings most of it up again. The stools are certain to be abnormal, green, and curdy if the infant is taking cow's milk. Later they are pale and foul-smelling from the presence of decomposing food, often resembling putty in appearance. The buttocks are raw and excoriated, the abdomen is distended with gas, the extremities are cold and blue, the tongue is dirty, and the mucous membrane of the mouth is covered with thrush. The infant is constantly whining, rarely sleeping for long together, and wearing out the patience of its nurse and mother by its sleeplessness at night. It progressively wastes. At first it may be only flabby about the legs, then there is obvious loss of flesh, while the face still retains its plumpness. Later the skin hangs in wrinkles on the thighs and arms, the face is shrunken,

the temperature is low, the skin has an earthy tint, and the infant has a sickly smell of sour milk. The sunken eyes, with well-marked lines on the face, give it a look of age quite foreign to an infant. It reminds one of the description of 'Jude the Obscure.' 'He was Age masquerading as Juvenility, and doing it so badly that his real self showed through the crevices.'

In the final stages, if the infant is not carried off by pneumonia or some other intercurrent affection, it becomes little else but skin and bone, and gradually passes into a drowsy condition, with the eyes half closed and turned upwards, and there are frequently convulsions before death.

Such cases as the above are common enough among the illegitimate infants born in a great city. Who has not heard the pitiful story again and again of a woman, without means or help, left with a tiny infant to rear? She tries to earn a scanty living by working long hours at a sewing machine, or in washing flights of warehouse steps, supporting life in a desultory sort of way, on tea and bread and butter. The infant is 'out-to-nurse' during the day, and fed on boiled bread and stale cow's milk; while the mother, weary with the day's work, gives it the breast at night, and has to spend the greater part of what should be her sleeping hours in 'hush-a-bying a baby which won't be hush-a-bied.' No wonder that it whines and wastes, that it is a misery to its mother and itself, until 'the curtain falls on its unnecessary life, and all is well with it again.'

CHAPTER XII

EARLY SIGNS OF DISEASE

Inspection of the child.—The experienced nurse or mother will quickly detect any sign of disease or ill-health in a child, by its general behaviour, its cry, or by the expression of its face. It is perhaps easily tired, or it wants to be nursed instead of playing, or it refuses its food. During sleep the expression of the healthy infant's face is that of complete repose, there is no movement of the nostrils, the breathing is easy, and accompanied by a slight rise and fall of the abdomen. When awake it has a contented look, there is no crying, and if old enough it can easily be coaxed into a smile. When examined naked or in its bath, it will be seen that the skin is soft and smooth, the flesh firm, and the limbs and body well padded with fat.

It will be noted that the head and abdomen are proportionately larger in comparison with the limbs than in adults.

The size and weight should correspond with the age, though it must be remembered that there are big babies and little babies, and the latter may be perfectly healthy. Very fat, and consequently heavy babies are not usually strong, they are mostly pale from poorness of blood. Thinness and abnormally

soft flesh suggest bad digestion or ill-health of some sort.

Head and face.—A mother's anxiety is easily aroused about an infant's head, as any abnormality suggests serious disease or backwardness of brain. The shape and size of the head, and the condition of the fontanelles will naturally attract attention. The shape and size of the skull varies without necessarily denoting disease or deficiency of brain, and in infants and young children it is large in proportion to the size

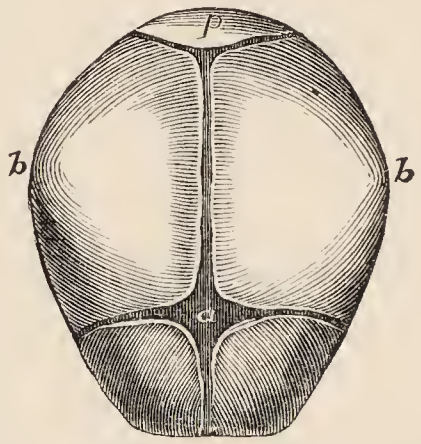


FIG. 23.—SKULL OF A CHILD AT BIRTH, SEEN FROM ABOVE (Leishman). (One-third the diameter.)

a, anterior fontanelle; *p*, posterior fontanelle; *b*, *b*, parietal eminences.

of the body. The anterior fontanelle (*see* fig. 23) in a newly-born infant is about $\frac{3}{4}$ in. in length, it has an elastic feel, and the pulsation of the vessels of the brain beneath it can be both seen and felt. The anterior fontanelle gradually gets smaller as the child grows older, and is usually closed up by the growth of bone by the end of the second year, leaving a depression in place of the open space. In rickets, and also when there is 'water on the brain,' the fontanelle is slow in closing. After a severe labour the infant's head is

elongated in consequence of compression in coming through the pelvis, and the scalp on one side, usually the right, is swollen. This, however, soon passes off. A large round head, with a widely open bulging fontanelle, suggests chronic hydrocephalus, that is, 'water on the brain.' An abnormally small head or a deficiency in the frontal occipital, or parietal regions, suggests idiocy, or at least a deficient brain. If, as months go on, the infant has a blank expression, its limbs are limp, and it is late in learning to hold its head up, the suspicions of brain deficiency will be confirmed. In rickets, if the disease is well marked, the head is usually large and square in shape, but this does not become marked in most cases till towards the end of the first or beginning of the second year.

The face of an infant or young child wastes less than other parts of the body, so that it may remain comparatively plump after the limbs have become soft and flabby. The 'face is the best part of it' is a common expression in speaking of children; and, indeed, it is quite true that the face betrays disease, as far at least as malnutrition is concerned, less readily than the rest of the body. Weakly infants, and those in which the circulation is poor, are apt to become temporarily pale or of an ashen colour, or there may be blue coloration about the mouth if the child is frightened or exposed to cold.

In some cases of congenital heart disease the lips and face are habitually purplish. In acute or chronic abdominal disease the face becomes more or less wasted or drawn, and the eyes sunken and half-closed. The latter symptom nearly always indicates severe

disease. In affections such as bronchitis or inflammation of the lungs, the face is flushed and distressed, and the nostrils dilate during an inspiration, in the attempt to draw in all the air possible. In the early stages of convulsions the facial muscles, especially the muscles of the eyelids, twitch, and there may be also more or less squinting.

Respiration.—If an infant be watched in its sleep it will be seen that its respiratory or breathing movements are abdominal, that is to say, that while the chest moves but little, the abdomen moves up and down with the contractions of the diaphragm, the important internal muscle of respiration. The respiratory movements in an infant when asleep will perhaps vary from thirty-five to forty per minute. By the end of the first year and during the second year they will average from twenty-five to thirty.

A high temperature, from any cause, gives rise to an increased number of respirations; an infant with a temperature of 102° or 103° or more will very likely breathe at the rate of fifty to sixty times a minute; fever quickens the action of the heart, and this in turn gives rise to an increased rate of breathing. In such diseases as bronchitis and inflammation of the lungs, or where part of the lung is in a state of collapse, the number of respirations are increased in proportion to the severity of the attack, or the amount of lung placed *hors de combat.* Both in bronchitis and in croup, where there is much obstruction to the air entering the lungs, the respiration rate will be increased, and also the chest walls and pit of the stomach will be sucked in during inspiration. Infants at the breast who are suffering from bronchitis or pneumonia

will perhaps suck vigorously for a moment, and then have to stop to take breath. Noisy snuffling respiration is caused by a thickness or obstruction in the nose, from the mucous membrane being swollen, or from an excess of mucoid secretion being present. In children suffering from croup the breathing is frequently 'stridulous'; this characteristic sound is caused by the vocal cords being swollen, or perhaps covered with 'false membrane.' In some infants there is from birth 'crowing' inspiration, the sound being produced in the larynx, and being worse at times, especially when the infant is disturbed. It is common in backward children. Rickety infants are also subject to what mothers call 'child-crowing,' that is, they make from time to time a crowing sound during inspiration. This sound is caused by the development of spasm, and a consequent narrowing of the space between the vocal cords, and is always worse when the infant cries or is excited. Sometimes in these cases instead of crowing sounds there is a 'catch in the breath'—the infant draws in its breath then suddenly holds it, and becomes perhaps blue in the face for a moment, then after a slap in the back, or a shake, starts breathing again (*see* p. 169).

The character of the cough differs in different cases: there is the short, dry, hacking cough, heard in pneumonia or in the early stages of 'hooping cough' or measles; the 'croupy cough' of catarrh of the larynx or 'croup'; the loose cough of the later stages of bronchitis. In pleurisy there is the cough which is followed by a cry on account of the sharp pain which accompanies it.

In hooping cough, when the spasmodic stage is

established, the cough becomes very characteristic. The child often knows that a fit of coughing is at hand, and will run to its mother or exhibit signs of fright. The attack consists of a series of expiratory efforts, in the most severe cases leading to the child becoming blue in the face and lips, and these are followed by a long drawn high-pitched sound which constitutes the 'hoop,' or 'whoop.' Vomiting is very apt to follow.

In rickets, the ribs are apt to soften and bend easily, and the chest walls to be deformed, the sides of the chest perhaps become depressed, and the breast bone unduly prominent. Where the ribs join the cartilages, small bosses are present.

Temperature.—Perhaps the most convenient place for taking the temperature of an infant or young child, is the fold of the groin, the leg being crossed over and held so as to keep the thermometer in its place. The thermometer may be inserted in the rectum, and there is no doubt that rectal temperatures are less liable to error than those taken either in the groin or axilla, on account of the thermometer being surrounded by mucous membrane instead of skin. But many of the more fragile class of thermometers now in use are too delicate in structure for use in the rectum, and an accident through the thermometer breaking might give rise to injury. I have known ulceration of the rectum caused by the use of thermometers placed there by careless nurses. Rectal temperatures are usually half to three-quarters of a degree higher than those taken in the 'arm-pit' or groin. Temperatures are usually at their lowest in the small hours of the morning, and at their highest

in the afternoon or early evening, from 4 to 6 P.M. In most febrile attacks the temperature is highest in the afternoon or evening, and lowest in the early morning, though there are many exceptions to this. In weakly infants, or those suffering from wasting diseases, the morning temperature may sink to 96° F., or even lower.

The abdomen.—The abdomen is proportionately larger in the infant than in the adult, partly on account of the large size of the liver, and partly because the relaxed condition of the muscles of the abdominal wall and the walls of the intestines, in infancy, allow the intestines to become distended with gas. In chronic indigestion in infants and young children, the abdomen is abnormally large and tense from the presence of an excessive quantity of gas, sometimes spoken of as 'bound wind.' The stomach is also apt to become dilated, and consequently to occupy an abnormally large space in the abdomen. When, as is often the case, there is wasting of the fat and other tissues of the body, the contrast between the large abdomen and the wasted body and limbs makes the former appear proportionately large.

The limbs.—During any illness, however slight it may be, from which the infant suffers, there is a certain amount of loss of flesh, the legs and arms showing signs of becoming thin and soft. Normally the thighs are plump and fat, but when any wasting sets in the muscles become soft and the skin hangs in folds. If the wasting is progressive and the infant continues to live, it may become extreme. During the last half of the first year or early part of the second, the bones of the wrists or ankles may

show signs of rickets. In this disease the ends of the long bones, more especially the lower ends of the bones of the forearms and leg, become much enlarged, and in consequence give the wrists and ankles a peculiar appearance.

The shafts of the long bones and ribs are apt to soften and bend; the commonest deformity which occurs about the time the child is learning to walk is that known as 'bow-legs'; the bones of the legs below the knee being bowed or curving outwards. The ankles in this condition are inclined to turn out and the foot to become flat. Later, when the child has walked, the knees give way and come together; this condition is known as 'knock-knees,' and gives the child a very characteristic waddling walk.

Urine.—The newly-born infant passes water within twenty-four hours of birth, and then usually wets some ten or twelve times in the twenty-four hours during the early months of infancy. The urine of infants is usually paler in colour than that of adults, and during feverish attacks it stains the napkin of a yellowish colour, and the same occurs also in jaundice. In some cases dark-coloured grains of sand (uric acid) may be passed in the water, and be seen on the napkin; in rare cases large quantities of uric acid are passed. Bright blood in more or less quantity may be seen in the urine or staining the napkin. This is most common in infants during the second half of the first year or during the second year, and is usually the result of a too long continuance of a diet from which fresh food is excluded (scurvy). The greatest care should be taken to change napkins as soon as they have become wet from soaking up the

urine or motions. Contact of wet napkins with the skin of the buttock is exceedingly likely to give rise to soreness, redness, and excoriation of the skin. When this has taken place it is always advisable to use a napkin of 'Gamgee tissue,' or to keep a pad of cotton-wool in contact with the sore buttocks in place of the ordinary napkin.

As the infant grows older, a large amount of wetting may be saved by careful training. If the infant is held out at stated times during the day and night, it soon gets into the way of passing water at these times, and a large amount of trouble from wetted napkins will be saved. Sometimes infants and children will have a far greater number of accidental wettings than at others, especially after being exposed to cold or when suffering from indigestion. Children who have gone for weeks without wetting their beds or having accidents during the day, will, without apparent cause, take to wetting their beds at night, and be constantly wanting to pass water during the day. This irritability of the bladder may be the result of cold, or the result of some indigestible food taken.

At nine or ten months of age the napkin can usually be left off entirely if the nurse or mother has been careful to train the child from the first. In other children, for long enough after this period, there will continue to be accidents both by day and night.

Fæces.—For the first few days after birth the motions passed are of a dark green or dark olive colour, and really consist of the bile which has accumulated in the bowels before birth. Meconium is the term applied to these biliary stools. After all the meconium has been expelled, the stools, if healthy, are

of a bright yellow colour, homogeneous and semi-fluid, and without any odour. When weaning has taken place and the diet has changed to a more mixed one, the stools become more and more semi-solid, brownish, and of a distinctly fæcal odour. During the second year they develop the appearance and odour of adult fæces. Many alterations in appearance occur as the result of abnormal conditions. If the infant is fed on cow's milk there is usually more or less white curdy material in the stools mixed with yellow bile, especially if the bowels are at all loose. Loose curdy motions mixed with green bile (green motions) are common where there is catarrh of the bowel, the yellow colour of the bile becoming changed to green. Putty-like semi-solid stools, foul and of a whitish colour, are usually present in cases of marked wasting. The stools of infants should always be carefully watched by the mother or nurse, as important information with regard to digestion may be gathered from careful and continuous examination. In catarrh of the large bowel or rectum there is usually a quantity of slime or mucus in the stool. Black stools are usually the result of an admixture of blood, the blood coming from the small intestines ; when streaked with bright blood, the bleeding is mostly from the large bowel or rectum. A large quantity of bright blood mixed with slime passed by the bowel suggests a stoppage caused by an invagination of the bowel, a condition of great danger. In this condition there is usually much straining and also vomiting.

Skin.—The skin of the newly-born infant is of a red colour, from a congested state of the blood-vessels supplying it ; this red colour fades in the course

of a few days or a week, the skin becoming of a pale pink colour. Slight jaundice, coming on a few days after birth and lasting for about a week, is not uncommon in newly-born babies. Weakly babies are more often affected than strong ones. The skin of an infant is exceedingly delicate and easily becomes excoriated, as, for instance, in the region of the rectum and genitals where it comes in contact with wet napkins. Various **rashes** are met with during infancy. Perhaps the commonest eruption is that produced by sweating; the rash consists of small red points, which quickly form into tiny heads containing clear fluid; in a day or two these dry up, forming tiny scabs. This rash is called **Miliaria**, or **Sudamina**. Another form of sweat rash is called by nurses 'red gum'; the rash consists of crops of red pimples, which are often attended with much itching. This rash is often assumed without any foundation to be due to 'teething.' Ignorant nurses sometimes speak of a 'tooth' rash; in reality there is no such rash. **Nettle-rash** is one of the most troublesome rashes which occur during infancy and early childhood. The rash consists of raised, flattened lumps surrounded by a red area; the pimples sometimes become vesicles—that is, appear like little bladders filled with clear fluid. The itching and irritation are often very great, and much scratching is the result. This rash is very frequently caused by the bites of fleas, midges, or other insects. At other times nettle-rash is caused by some undigested or irritating food in the stomach or intestines.

Young children are very apt during hot weather, and especially when away for holidays in the summer

time, to suffer from the bites of midges and 'harvest bugs.' Their exposed legs make them especially liable to be bitten, and midges will crawl up sleeves and penetrate through stockings. Perhaps vesicles and also pustules form, followed by ulcers which are slow to heal. The itch insect produces a similar irritation. The great point is to allay the itching and prevent scratching, especially at night. Carbolic or weak sulphur ointment [1] may be applied, and the feet put into old cotton stockings.

Convulsions.—In the less severe attacks, there is a momentary pallor of the lips, a twitching of the muscles of the face, eyes, and fingers, a catch in the breath, and the fit is over. In the severe forms, there is a sudden cry, a stiffening of the body and limbs, the breath is held, and the face and lips become pale or blue in colour; after a few seconds the muscles relax, the face and fingers twitch, the breath is drawn again, and the infant falls into a sleep. Sometimes one fit follows another in rapid succession. The causes of convulsions are numerous, often the immemediate cause is colic from the ingestion of improper food, or a high temperature from any cause, as pneumonia or influenza. Rickety children are especially prone to convulsions. Convulsions sometimes mark the onset of some severe disease.

Enlarged Glands.—The glands in the neck are apt to enlarge and become tender in acute diseases such as scarlet fever or diphtheria. A more common cause is some ulceration in the nose or mouth (*see* pp. 113 and 114). The glands may become tuberculous, and chronic abscesses form.

[1] *See* Appendix.

CHAPTER XIII

MENTAL DEVELOPMENT OF THE INFANT

Movement.—The movements of the infant during the first few weeks of life are not voluntary ; it has no power to 'will' ; it has no 'will of its own.' It makes no effort, has no ideas, and its consciousness of the outside world must be of the dimmest kind. Loud sounds will make it start ; it will follow a bright light with its eyes ; it is hungry and it cries ; the nipple is placed in its mouth and it sucks. The gateways of knowledge are there, but the storehouses of knowledge in the brain, where ideas of the outer world are formed, are as yet imperfectly developed, and without these no 'willed' movement can take place.

The human infant is of all newly-born mammals the most helpless and immature, for not only are the higher brain-centres in a backward state of development, but the infant has not for the most part the ability to perform instinctive movements like the young of other animals, and many months must elapse before it can use its legs for walking or feed itself. Well might it say with King Richard III. :

'. . . Unfinished, brought into the breathing world before my time, but half made up !'

But if it is thus immature and helpless, the 'human

infant is *par excellence* the animal that learns,' and if its possessions are small its possibilities are great.

Yet every nurse knows that the newly-born infant moves at least the hands, feet, lips, and face. All these movements are involuntary and are of the simplest kind. Some of them appear to be random or spontaneous; others are simple reflexes, the movement being the result of some external stimulus; in one or two we can trace instinct, that is, 'congenital activities,' which are 'ready made' at birth, resembling the more or less perfected movements of newly-born mammals or birds.

Spontaneous or random movements.—If a newly-born infant or one a few days old be watched carefully, especially when it wakes out of sleep, it will be noted that slight movements of the muscles of the face and eyes take place from time to time. The hands move in an aimless sort of way, the fingers open and shut, the legs perhaps make some imperfect kicking movements. These erratic movements, which are without purpose, are perhaps really the result of stimulation, and are therefore more reflex than spontaneous in character. Similar aimless movements take place before birth. The crowing and babbling which the healthy infant delights in, when a month or two old, are better instances of spontaneous activities, being an overflow of nervous energy. The vigorous kicking movements seen at this time are of the same kind.

Reflex movements.—Most of the movements which the infant performs during the first two or three months of its career are the result of the working of some stimulus outside its nervous system. The

contraction of the different muscles is not the result of will, or any spontaneous overflow of nerve force, but is the result of some external stimulation. Thus light falls on the retina, the excitation passes along the optic nerve to a centre in the base of the brain, the stimulus is reflected along a motor nerve to the iris, some of its muscular fibres contract and render the pupil smaller. The infant's first cry is a reflex act, the stimulus being in part at least the cooling effect of the air and the bodies with which the skin of the infant comes in contact. Bring a light near the baby's face and it will blink ; place some sweet fluid in its mouth and it will swallow.

All these movements follow the stimulus with a 'Jack-in-the-Box' regularity. The infant is unconscious of them and cannot control them. The reflex acts which take place during infancy are in operation through life, but many of them we learn to control as growth proceeds and habits are formed. We can never control the movements of the pupil, but we can in part control the movements of respiration, though if the stimulus becomes stronger and stronger the respiratory movement takes place in spite of our efforts to prevent it. The child learns in time to overcome the tendency to cry for trivial aches or pains, and also to control the emptying of the urinary bladder; but if the stimulus increases in strength the cry bursts out or the bladder empties itself in spite of the strongest effort of will which can be put forth.

In the convulsive fits to which some children are liable we see instances of disorderly reflex movements taking place ; the nervous centres are in a morbidly

sensitive condition, some irritation occurs, as colic, and then disorderly and erratic convulsive movements of the muscles take place (*see* p. 140).

Instinctive movements.—These movements are for the most part reflex in character, but are more purposeful, and a larger number of muscles are brought into action than in ordinary reflex movements. Instinctive movements play a very important *rôle* in the young of most animals, in enabling them, very early in life, to provide for themselves and to commence the struggle for existence. The lower the animal is in the scale of life, the more numerous and perfect are the movements which it can perform at birth or shortly after, and the less it has subsequently to learn ; while man, the highest in the scale, is completely helpless at birth and has a long period of infancy, but is capable of a very high development.

Some instinctive movements are performed with accuracy soon after birth ; others require practice, and consequently a certain length of time has to elapse and development to take place, before they are well performed. Thus Lloyd Morgan writes: 'Young moorhens as soon as they are born and have recovered from the shock of birth can swim with definite accuracy of leg movement.' 'On the other hand, young swallows cannot fly at birth ; they are then too immature and their wings are not sufficiently developed. But when they are some three weeks old, and the wings have obtained functional size and value, little swallows will fly with considerable if not perfect skill and power.'

The human infant is provided with but few movements at birth which can be called instinctive.

Sucking is perhaps an instance, though it is a reflex very similar to other reflexes. Young infants will carry their hands to their mouths in an awkward fumbling sort of way, and they will suck their fore-fingers if hungry. Seizing, which comes later, holding up the head, and walking, are instances of instinctive movements which are not ready made at birth, but which require to wait development and much practice before being perfect. Preyer noticed that his boy clasped his father's fingers as early as the fifth day; he did not notice any advance on this till the twelfth week, then he held a finger or pencil in his hand, using thumb as well as fingers. It was the seventeenth week before he made any attempt to seize a ball that was in his reach (*see* p. 153).

Dr. L. Robinson has shown that newly-born infants will clasp a horizontal bar if placed in their hands, and in this way support their own weight, and Dr. Mumford has confirmed this.

We may say that sucking and clasping are instinctive movements which are perfect at birth; while holding up the head, sitting, standing, walking, are instinctive movements which have to await development are acquired only after failure and success, and which tend to become habitual.

Growth of voluntary power.—The infant of six or eight weeks old takes more notice of bright lights or coloured balls in motion than an infant of a week or two old. The mind has been undergoing an awakening during the few weeks which have elapsed, the higher brain centres are developing, and objects now make much more impression on the cerebrum. The infant's waking hours are longer than they were,

and when wide awake and at its best it will stare with a timid expression into its nurse's face or at a brightly-lighted picture, and it will laugh and crow when in happy mood.

At three or four months of age its head no longer rolls over when it is unsupported, but when its back is supported in its nurse's arms it will hold it up and look about. The disposition to hold up the head is instinctive; the immediate attempts to do so are stimulated by the wish to get a better view of what is going on around it. It is doubtful if this movement of holding up the head is voluntary in the strict sense. Professor Mark Baldwin points out that most of the infant's movements at this time are reflex, the stimulus being a 'suggestion' which evokes the movement. The sight of the mother's face evokes a smile, the appearance of the feeding-bottle is accompanied by signs of joy, the cap and hood suggest an outing and its pleasures, just as the stick and hat bring joy into the heart of a fox terrier. Baldwin noted that his little girl 'began to show a vague sense of the use of her articles of clothing about the fifth month, responding at the proper time, when being clothed, by ducking her head, and extending her hand or withdrawing it.' After having gone through the performance a great many times, the sight of the garments in the act of being put on excites the accommodating movements on the part of the infant. An association or habit is thus established. It is quite certain that a 'suggestion reflex' requires the presence of a much more highly organised brain centre than simple reflexes like the movements of the iris.

At six months of age the infant is cognisant of a

good deal that is going on around, and is beginning to distinguish between its mother and nurse or strangers, and to recognise many of its nursery gods. It can read its mother's face and knows when she is angry or pleased. It is attracted by many things—familiar faces, brightly-coloured objects, balls, or anything in motion. It can seize objects now in its hands, and by means of touch, sight, and muscular movement is forming ideas of the size and shape of objects within its reach.

It sits comfortably if propped up with pillows, but its back is not yet strong enough to support the weight of the body without aid. It is unwise to allow too much sitting, even though propped up.

Usually, by the eighth or ninth month the infant shows signs of imitating or copying. Long before this it unconsciously imitates; but now imitation of the conscious sort begins, and with it a new era in its life. Imitation now is the chief means of its mental advance, as it is by imitation that it learns fresh movements, and, moreover, learns to talk. A copy is set, the infant tries to copy, and by persistent effort succeeds, and derives much pleasure from its success. At this stage it originates little or nothing, but learns by imitation. An infant sees and hears a teaspoon knocked against a tea-cup, and it attempts to do the same with more or less success. Its hands are taken by its mother and shown how to beat a drum or to knock a bunch of keys against a vase; the next day, when it sees the spoon or the keys, it recalls the pleasures of the day before, and tries to repeat the performance on its own responsibility. Henceforth in a hundred ways, in seizing, walking, or in attempts at speech, it imitates

those around it and gets pleasure from success and disappointment from failure.

The infant is now far enough advanced mentally to get a clearly-pictured idea of the copy, then it makes an effort to perform a similar movement, and we have the first stages of voluntary movements.

About this time—namely, at eight or nine months of age—Professor Baldwin has shown that his children showed a marked preference for using the right hand when reaching for objects that required exceptional effort. They used right and left hands indifferently when the object to be reached was close at hand or within easy reach. This tendency to right-handedness appears from this to be inborn, or to depend upon the left side of the brain being somewhat in advance of the other as far as development is concerned. It is interesting to note that as regards speech we use the left side of the brain.

By the tenth month, perhaps a little before, the infant can sit up by itself firmly and strongly on the floor or in its bath. For months it has been sitting up with help or support of some kind, but now it is independent of any artificial aid. But it is rarely content with sitting still, that is a performance quite outside its capabilities, it must be on the move or on the 'go' in some way.

Walking.—The first method of progression is often by rolling. The child will roll over and over on the floor to get within reach of some coveted toy. At other times, instead of rolling, locomotion takes place by a sort of shuffling sideway cross-legged progression, the feet and ankles being used like paddles to propel the sitting infant along sideways. It is not long

before some sort of creeping is successfully attempted, though some children walk before they crawl. The infant turns on its stomach perhaps by lying on its back, holding its legs straight up in the air, and using them as levers to turn over by. Once on its chest and stomach, it perhaps uses its hands to pull itself along, dragging its legs after it. Later it gets on all fours, and then nothing in the room within its reach is safe. There is now no keeping it still; if put on the floor it quickly visits all parts of the room, preference being given to the coal scuttle, or it makes for open drawers or cupboards and ransacks their contents. It will perhaps crawl for a chair, and then, monkey fashion, it will pull itself into an upright position by means of its hands. This four-legged progression is performed by some children very quickly, as nurses know to their cost, for they are in mischief in the twinkling of an eye. Two-legged progression is a much more difficult affair, and it requires some practice and determination to overcome the difficulties of balancing, and many attempts have to be made before confidence is acquired.

Is walking an instinctive act? The answer must be in the affirmative, though the organs necessary are not perfected at birth as they are in some animals, but take a year or more to develop. Long before the child can walk alone, if its body is supported by its nurse so that its toes are just allowed to touch the ground, it will make regular walking movements with its legs, placing one before the other, though sometimes the walking movements which it attempts would propel it backwards. The stimulus excited by the contact of the feet with the ground tends to star

reflexly the walking movements. While walking is no doubt a congenital activity, volition plays an important part in perfecting it. The infant receives encouragement from its nurse, and is anxious to be able to get about and to bring a number of new objects within its reach. Perhaps to some extent it imitates other children or adults. Before it can walk, a certain degree of development must have taken place in its legs and joints, the bones and ligaments and muscles must have become strong enough to bear the weight of its body, and the hips and knees must be held rigidly and be fixed. It must have got some idea of space, have learnt to distinguish objects clearly, as well as to balance itself and perform with nicety muscular movements.

Any backwardness in mental development, any weakness of the muscles, softness of bone, or looseness in the joints, will prevent the child from walking alone at the usual time. Rickets is a common cause of lateness in walking.

Even healthy children differ with regard to the time of learning to walk. Usually the earliest attempts are made about the tenth month, but three or four months more are occupied in learning to walk with safety.

The first attempts at walking must necessarily be preceded by the ability to stand alone. At first the upright position is only maintained by the help of the hands, the child catching hold of any fixed support available, such as chairs or tables. The infant crawls off to a chair, pulls itself up by the help of its hands, then either pushes the chair in front of it or travels from chair to chair, or from chair to table. I

often notice children in our hospital wards, who cannot walk alone, taking a trip every morning round the ward, pushing a chair in front of them over the smooth polished floor, and collecting toys from the other children as they go round.

The first steps taken without assistance are generally made by a sort of rush from one haven of safety to another, usually ending in the mother's arms. These essays are made in some cases before the end of the first year, much more often not till the end of the fourteenth or fifteenth month. It is not wise to encourage walking early, lest the loose knee joints should give way under the child's weight, and more or less deformity take place. By all means encourage crawling, avoiding draughts, and protecting the child from cold. Crawling about the room and investigating the various articles of furniture in the nursery is an efficient means of education.

Even when the child has learnt to walk a few steps, some time passes before it is sure of its feet. A few steps are taken, and then it plumps down on the floor or catches hold of the furniture to save a fall; but, as a matter of fact, it seldom hurts itself, for its legs are short and it has not far to fall. Confidence comes slowly, and nervous children are longer in learning to walk than more courageous ones. Gradually, as time goes on, the child can stump about the nursery without paying any attention to his feet, or without many tumbles. For a long time after he has learned to get about fairly well he is easily tired with the exertion, and then trips up on any objects in his path. His gait, too, for a while is awkward, his legs being far apart as he walks, so as to give him a broader

base of support. The ability to clear objects in his path, such as a doorstep, or to go upstairs, is not usually attained till the child is eighteen months old, but often it is even later than this.

Running and jumping are movements which are acquired later still, and it is only quite at the end of the second year, or at the beginning of the third, that the child runs or jumps with any confidence, unless assisted by friends holding him by the hands. Running and butting with the head like a mountain sheep is a trick that seems to come naturally to the child when roused to anger.

Kneeling is a position which children are late in assuming by their own initiative, though every mother knows that it is a favourite position for older children when at play.

Kicking is learnt later than walking, for as it is performed in the upright position, it means balancing on one leg for a moment or two. At eighteen or nineteen months, a normal child is usually able to kick a ball or some other object about the nursery floor. This he learns by imitation. Kicking when in a temper, is no doubt instinctive, and derived by inheritance from our savage ancestry.

The hand.—The hand is, *par excellence*, the human organ, as no brute has any member that can at all compare to it for the performance of work which requires precision. The tips of the fingers are endowed with an exquisite sensibility of touch, the brain, so to speak, is at the end of our fingers, whilst the complicated system of joints and groups of muscles enables the hand to perform the delicate movements required for writing, painting, or wood carving.

The education of the hand is going on from infancy throughout the whole of our existence until old age dims the vision and saps the energies of life.

I have already described the movements of the hand during the first days of life as being aimless, though the infant can clasp an object if placed in the palm of the hand. It can manage to get its fingers or thumb into its mouth in a fumbling, uncertain sort of way; indeed, Mrs. Moore noted that her infant was sucking its thumb within an hour of birth.

For the first two or three months the hand is not used much for seizing, though the infant will grasp objects if put into its hand, but quickly drops them again. About this age it will grasp the dress or hair of its nurse if they come in its way. At this time the method of grasping is clumsy, as several writers have pointed out, in that the thumb is not brought into use, nor are the movements of pronation and supination [1] utilised to their fullest extent.

At four or five months the infant is far more clever in using its hands for seizing and holding on to objects, such as coloured balls suspended over its bed, or spoons or other objects within reach, including its own toes. The thumbs are coming more into use now; though the infant is by no means perfect or precise in its movements, the thumb can be brought into contact with the index finger, but not folded across the palm of the hand (*see* fig. 24).

At eight or nine months the infant begins to imitate movements with its hands, such as knocking a spoon against a cup, or beating a toy drum if it sees some one else doing it. The intellect is now suffi-

[1] *i.e.* the movements of the forearm, as in using a screw-driver.

ciently advanced to form an idea of the act to be copied, and to allow of the hand being utilised as the servant of the brain. The hand is used in all sorts of ways now—in carrying things to the infant's mouth,

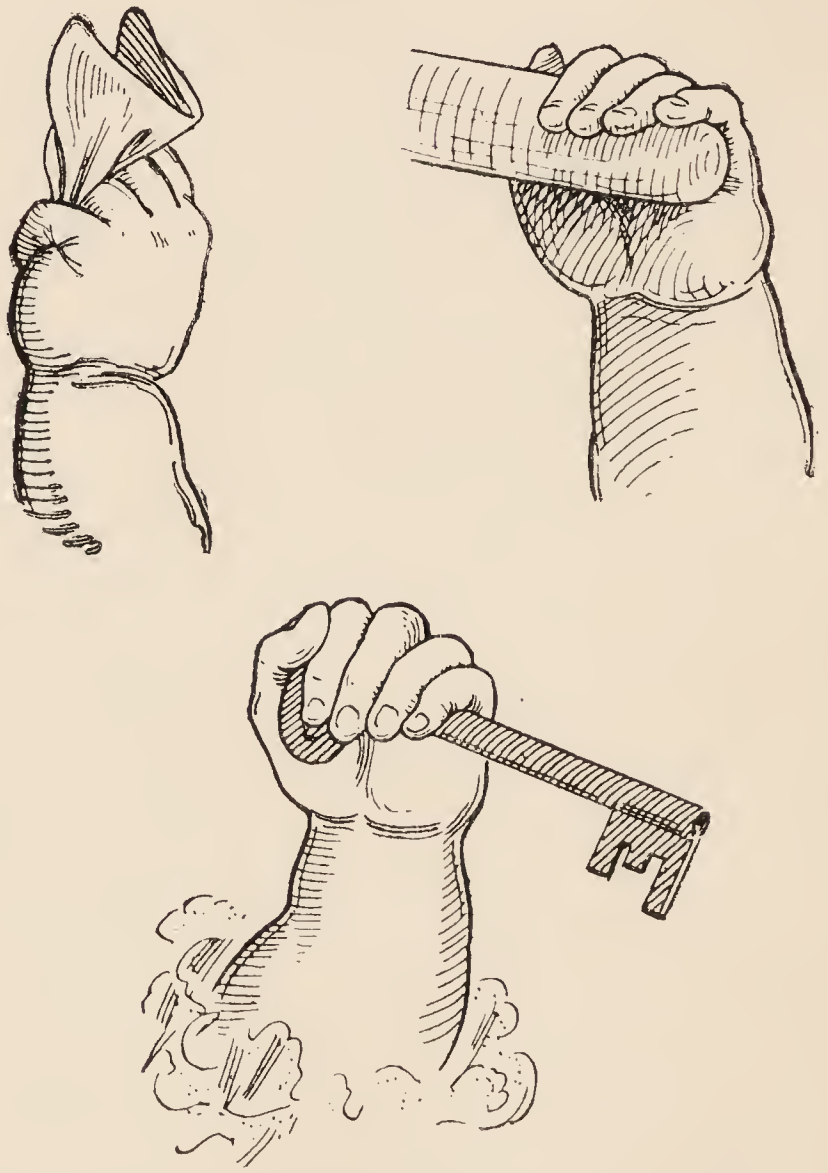


FIG. 24.—Infant's hands grasping (four months of age), before the thumb is fully brought into use (after Mumford).

steadying the feeding-bottle, pointing with the fingers, holding up a finger to demand silence, or stretching out the arms to request to be taken up; the hand is

constantly used to express its wishes or communicate with friends before it can articulate a single word (*see* fig. 25).

The child will hold a crust in the hand before the

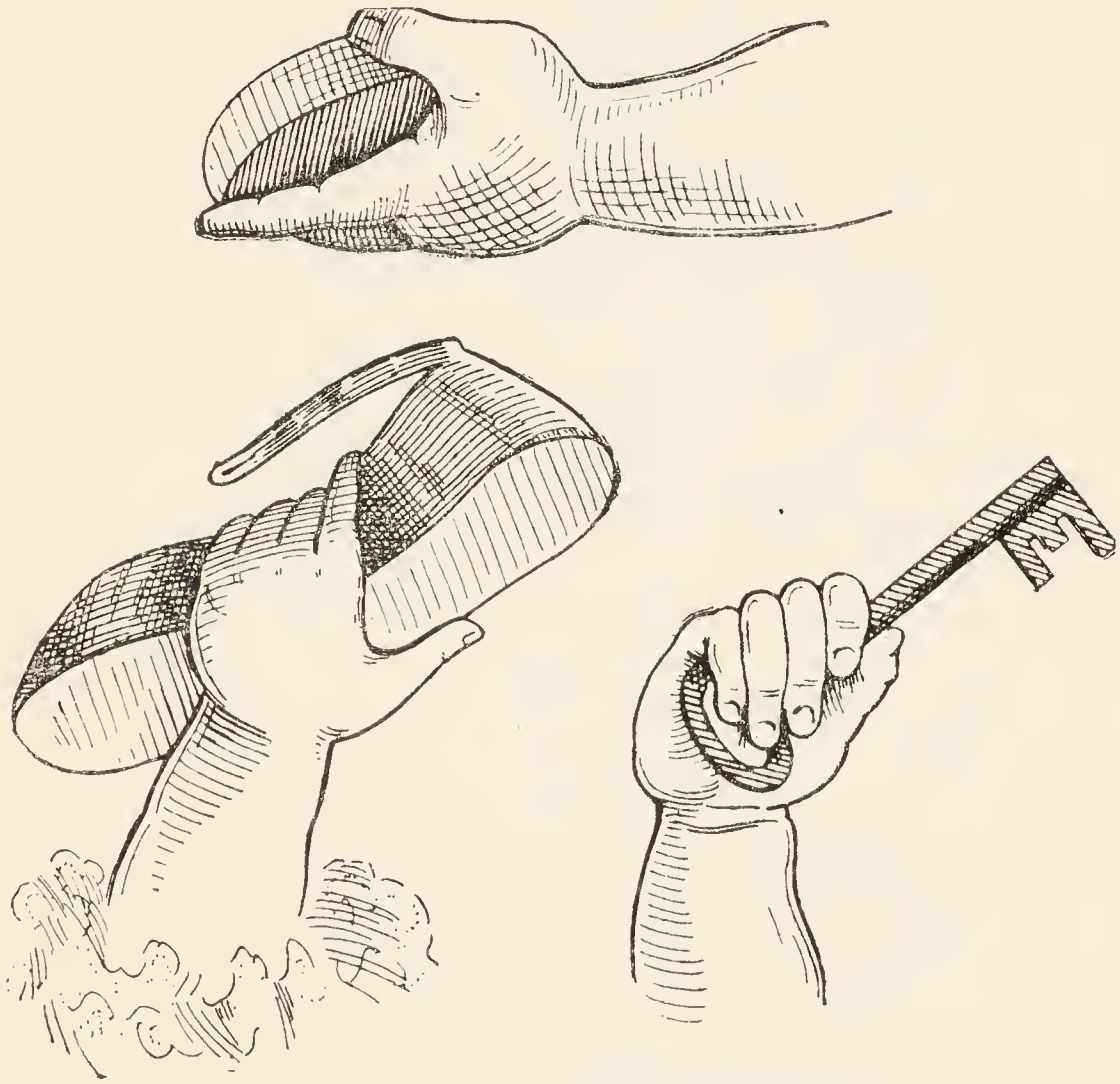


FIG. 25.—Infant's hand (eleven months) grasping, showing the thumb brought into use, and also power of pronation and supination [1] (after Mumford).

end of the first year, but it cannot feed itself with a spoon till the eighteenth month, and not, with any degree of skill, until the end of the second year.

[1] *See* Note, p. 153.

Throwing and hitting movements are learnt during the second year. The child will throw, or attempt to throw, some object when in a rage, or it will enjoy throwing a spoon on the nursery floor, or there is endless delight if it gets the chance to drop or throw stones into the sea. The pleasure of the act prompts its continuance; and the child will only desist, and that with signs of impatience, when its friends are tired of supplying it with ammunition. These activities are no doubt inherited, but are started by imitation.

The child soon learns to hit or strike with its hands just as it uses its legs in kicking, and this is especially seen in children who are badly brought up, and allowed to give way to tempers without check. It is, unfortunately, no uncommon thing to see an infant in arms, not much more than a year old, thrashing its nurse or mother vigorously as the result of some momentary disappointment.

The amount of skill necessary to perform writing or drawing movements is acquired, as would naturally be expected, later than such movements as putting the hands to the mouth. Professor Baldwin drew pictures of animals such as she had learnt to recognise, for his girl of nineteen months to copy; but her attempts were simple scratches, showing there was no connection apparent between a mental picture in consciousness and the movements made by the fingers and hands in attempting to draw it. For sometimes the child will only make scrawls on paper, and cannot be got to concentrate his attention on a copy and proceed to imitate. The same thing occurs in imbecile children. When desired to write, they will scrawl away on paper

most industriously in imitation of some one writing, but they have no ideas of letters or pictures. It was only in the twenty-seventh month that Baldwin noted that any resemblance could be traced between the child's drawing and the copy. Dr. Mumford tells me that his boy at twenty-four months of age would draw fairly good circles on the nursery blackboard and say 'round,' 'round.'

CHAPTER XIV

MENTAL DEVELOPMENT OF THE INFANT (*continued*)

Sensations

WITH regard to the gateways of knowledge, let us see to what extent they are of use during the first few months of life. It is certain that the senses of sight and hearing are but little developed in the newly-born. It is clear that in a narrow sense the infant can taste, and its lips, and to a lesser degree the skin of its body, are sensitive.

Sight.—With regard to the effects of light upon the newly-born infant, I cannot do better than quote the careful observations of Miss Shinn[1] on her niece. She says 'The child seemed quite conscious of the difference between light and darkness on the first day. At about an hour old she stopped crying instantly when a cover was placed over her face; her eyes turned towards any person who came near her, from this time on through the first and second weeks. As she really didn't look at any one before the fourth week, I could only suppose that she saw an approaching person only as an interruption of the light.

[1] *Notes on the Development of a Child*, p. 10.

'In the third and fifth weeks she gazed at light surfaces with apparent satisfaction, especially the light of the lamp on the ceiling, and the face of any one holding her, especially if it were turned towards the light.

'In the fifth week, she first went out of doors, and seemed to dislike the light, and kept her eyes shut. After this, pleasure in gazing at bright surfaces was gradually displaced by interest in faces. On the fortieth day the child's eyes for the first time followed the movements of a person who had attracted her attention.

'Soon after the sixtieth day I saw some indication that she recognised her mother, for she stopped fretting when hungry on seeing her come in at the door in her line of vision, not three feet away; no certain evidence, however, for any one's entrance might have diverted attention. The first unmistakable evidence by sight alone was on the eightieth day, when she smiled and gave a joyous look on seeing her grandfather. She certainly knew her mother before this, whether by sight alone, or by the aid of hearing and touch, I couldn't tell.'

Hearing.—How early in life are sounds heard? The newly-born infant takes very little notice of sounds, but it is obviously very difficult to test its hearing powers. Infants who are sleeping soundly are not awakened by loud noises, such as clapping of hands or a shrill whistle. Preyer found that his own infant during the first three or four days of life gave no reaction or sign of recognition with hand clapping, whistling, &c. Mrs. Moore noted that on the second day her boy stopped crying when his father whistled.

But on the fourth day, loud noises made close to his ear produced opening of the half-shut eyes, as the child lay comfortably half asleep in his cot. On the eleventh and twelfth days the same observer noted that her child became quiet at the sound of her voice.

In the fifth week the sensibility to sound had increased, so that the child wouldn't go to sleep if there were noises in the room in the daytime, whereas as late as the seventh day a loud call did not wake the sleeping child. The same observer noted that in the eighth week the infant heard and appeared pleased with the sounds of a piano, and the ticking of a watch close to its ear attracted attention.

It was not, however, till the eleventh week that it undoubtedly turned its head in the direction of the sound. Usually at about five months of age the infant notices noises made by itself, such as throwing the spoon on the floor, knocking it against a cup, or crumpling paper. About the same time, or rather later, infants distinguish the voices of their parents; but the sense of sight reinforces the sound memory image.

Sensibility to sounds varies with the state of health. The healthy infant will sleep soundly in spite of noises or disturbance, whereas the slightest sounds are likely to rouse it if sleeping lightly as the result of indigestion or dentition.

Touch.—That the lips, tongue, face, and mucous membrane of the nose are sensitive to the touch in the newly-born is proved by the fact that tickling the lips and tongue lightly with a feather will produce sucking movements, blowing gently on the face will

produce contraction of the facial muscles, and a blast of cold air will produce sneezing.

The sensibility of the skin generally is not great. The sensations of touch, pain, and temperature are feeble in early infancy. A wet napkin does not appear to produce much discomfort, in many infants at least; but when the skin about the buttocks becomes inflamed and excoriated, it is clear that any interference with these parts produces smarting. To some extent this insensibility is a matter of education; infants whose wants are not attended to, and who are left lying in wet napkins, feel their discomfort less than infants who are properly looked after. The sensitiveness of the skin at the finger tips is not acute, and indeed it would be useless until the infant is old enough to use its hands for touching or grasping objects. All through early life the sensibility of the skin, at any rate for sensations which come under the term uncomfortable, is not as great as it is in after life. Thus we find that cold hands and feet, running noses, saliva escaping from the mouth, wetted pants, &c., do not produce any discomfort, or, at any rate, the child quickly loses all feeling concerning them. This is especially true of backward and imbecile children, as any one who has ever been in an asylum for such will have noticed.

It is clear that the sense of taste exists in the newly-born. At least if quinine, salt, or bitters are placed on its tongue grimaces are produced, while sugar excites sucking movements.

Intelligence.—For the first few weeks after birth the infant gives no signs of intelligence, and no response in answer to the caresses, the smiles, or the

various attentions of its parents. It is true that it whimpers when it is hungry, cries perhaps with colic, goes off to sleep when satisfied and comfortable ; but it is a veritable sphinx as far as its worshippers are concerned. Perez's friend wrote to him in great distress about his infant, in the following words : 'He is a thorough little animal, voracious to excess and never quiet except when asleep or at the breast. I could never have believed that a little child was so absolutely an animal, with no other instincts than those of gluttony. To avoid being completely disgusted, one has to remind oneself that in a few months there will be some gleams of intelligence, and that the creature will begin to show some likeness to a human being.'[1]

A healthy infant at six or eight weeks of age has begun to take notice of what is going on around it. Its brain is developing, it will look about it, watch its nurse's face, and sights and sounds begin to make some impression on its mind and to give it pleasure. It will turn its head to follow the movements of its nurse, especially when she is engaged in the interesting pursuit of preparing its food, and before long will turn its head the better to catch sounds.

Sully relates how his boy of seven weeks old was attracted by a showy card framed and hung up in the nursery, and when carried near it would look up and smile ; the same boy by the ninth or tenth week noticed the pattern on the wall-paper of the nursery.

During the second quarter of the first year the infant learns to recognise the faces of its familiar friends and objects in the nursery, but is usually six months old before the recognition is very clear, so that indi-

[1] *First Three Years of Childhood*, p. 60.

viduals are distinguished from one another. Sound memories, sight memories, touch memories, assist one another in the work of recognition. The infant may not recognise its mother's face, but when she speaks the recognition is complete, the one memory reinforcing the other.

Professor Mark Baldwin relates an instructive experiment with a little child six and a half months of age. Her nurse, who had been with her for five months went away for three weeks; on her return she was asked to appear in the nursery, and show herself to the child, but not to speak; then to withdraw from sight and speak to the child as she had been accustomed to. Finally, she was to appear and sing a nursery song the child was accustomed to hear. The nurse was not recognised by sight, nor by the sound of her voice, but she was recognised at once when she appeared to sight and her voice was heard at the same time. The sight image and sound image reinforced one another, and recognition was complete.

During the second half year the infant is making a beginning of gaining knowledge of the external world by touch and muscular sense, though it is somewhat later before it makes much progress. Its hands come in contact with its mother's face, its bottle, a spoon, a pencil, its own toes and mouth. It seizes a ball, and associations are formed in its mind between the appearance of the ball, the feel of the ball, and sooner or later the weight of the ball.

By means of the senses of touch and sight we gain in early life, indeed all through life, a more varied knowledge of objects than in any other way. We first see an object, and then want to hold it in our

hands, feel its weight, and examine it closely by touch and sight. It is especially so in infancy, everything is new and strange, new objects attract, and there is a pleasure in handling them and examining them closely. The sensations of sight, touch, muscular sense, reinforce one another, and by their means the infant gets ideas or 'percepts' of the external world.

Sully writes: 'After many conjunctions of impressions the child begins to find out the nature of objects, and the visible aspects which are their most important marks. That is to say, he begins to discriminate objects one from another by sight alone, and to recognise them as they reappear to the eye. Sight now grows self-sufficient. What may be roughly marked off as the *touching* age gives place to the *seeing* age. Henceforth the growth of perceptions is mainly an improvement of visual capacity. At first this power of discerning forms with the eye is limited to objects of great practical or æsthetic interest, as the child's bottle, the rattle. The observer notes one or two prominent and striking features of a thing but overlooks others. Thus in looking at real animals, or at his toy or picture imitations, he will distinguish a quadruped from a bird, but not one quadruped from another and similar, as the goat from the sheep.'[1]

By the end of the first year the associations formed tend to become stronger, and consequently more lasting. Many instances of this might be referred to. Thus, a lady paid a visit to the mother of a little girl of thirteen months, taking with her some sweet violets which the small girl smelt and

[1] *Outlines of Psychology*, p. 162.

seemed to enjoy. A fortnight later the lady called again, this time without any violets, but immediately the little girl saw the lady she began to sniff loudly. The lady's face, and perhaps her hat and dress, recalled the scent and sight of the violets, and the child wanted to enjoy the scent over again. Or, to give another instance, a little girl, a few months older than the last mentioned, saw some one reading a newspaper and smoking a pipe. After some weeks she saw some one else reading a newspaper but not smoking ; immediately she began to make a noise like puffing of smoke from the mouth. The sight of the newspaper recalled the image of the pipe and puffs of smoke.

How soon do children recognise pictures of animals? Necessarily they must be acquainted with the appearance of horses, dogs, cats, sheep, cows, &c., before pictures of animals will be recognised. Many mistakes will of course be made. Baldwin's little girl recognised pictures of a clock and a cat as early as her twelfth month, and called them *ti-ti*, and *ps-ps*; but I think this is unusually early. It is not generally till some months later that children know the names of animals as *gee-gee*, *puss*, *moo-moo*, and until they can and do apply them properly it is difficult to test their knowledge. I expect, too, that in some nurseries children are taught the names of animals from a familiar picture book, and not from the animals themselves. They are expected to say *moo*, or *pussy*, where a particular coloured illustration is turned up.

CHAPTER XV

MENTAL DEVELOPMENT OF THE INFANT (*continued*)

Emotions and Sentiments

Crying.—Before birth the infant spends its time in continuous sleep, and is presumably oblivious to impressions of every shape and kind. The newly-born infant also spends the greater part of its time in sleep, and during its waking hours its mental condition is rather that of vague and 'indistinct consciousness'—at any rate, its consciousness is much below that of an adult. Under these circumstances it is doubtful if the sum of its pains and pleasures amount to much. It leads a sort of vegetative existence. It goes off to sleep when it has been fed, it wakes up when its digestion is complete and it is time for more food. It is hungry and it cries.

In the course of a few weeks or months the crying mechanism becomes more differentiated than it was at first, the nature of the crying now varying with the intensity of the stimulus, and later still the crying is accompanied by tears and a characteristic expression of face.

Thus the hunger cry is a whimpering, fretting cry, interrupted by longer or shorter intervals, and the

infant usually stuffs its fingers into its mouth. The whimpering ceases for a moment if the finger or teat is put into its mouth, but the crying shortly begins again, as it finds sucking at the finger does not satisfy. While such are the characteristics of the hunger cry, it must be said that it is difficult, sometimes impossible, to distinguish between a hunger cry and a cry evolved as the result of an uncomfortable feeling in the abdomen, such as distension from wind or indigestion.

Severe pain, such as griping, pleurisy, inflammation in the internal ear, gives rise to piercing continuous cries, which go on with but few interruptions. The infant may fall asleep from exhaustion, but it wakes again with the pain, and the crying starts off afresh.

The petulant cry of temper or anger, as when the infant is left in his cot or crossed in any way, is less loud and continuous than that of pain, and is accompanied, after the second month, by a stiffening of the back and limbs. Or it may be accompanied by grunting and twisting about.

This does not exhaust the list of cries. The experienced observer knows well the pitiful whine of the wasted, atrophic infant, and, after infancy is passed, the sharp cry which denotes inflammation of the membranes of the brain.

Infants differ very much in the extent to which they indulge in crying. It depends very much upon temperament and digestion. The worst and most inveterate criers are those who habitually suffer from indigestion. A good digestion favours good behaviour, while 'bound wind' and colic are fruitful sources of disturbed nights and much crying. Temperament

leaks out early in life, and while some infants, quite apart from any cause, are notorious criers, others take the world very much as they find it, and it is difficult to put them out. How much can be done, as the infant gets older, to educate it into habits of self-control, I have said elsewhere.

For the first few weeks, as a rule, there is no shedding of tears, though babies differ from one another in this respect. Mrs. Moore records the first tears in her baby on the tenth day, but it did not habitually shed tears when crying till the sixteenth week.[1]

Darwin very carefully studied the expressions of infants when crying. He noted that it was only after the fourth or fifth month that the characteristic expression of face is seen. The drawing down of the corners of the mouth is usually the first sign of the coming storm; then the eyes are firmly closed, and the forehead contracted into a frown, the mouth is opened widely, while a deep furrow occurs running from each side of the nose to the angles of the mouth. When screaming loudly the chest is first filled with air, and then forcibly expelled, giving rise to a loud cry. In later infancy sobbing occurs, and between the intervals the mouth assumes the form of a square

Does crying hurt babies? is a question sometimes asked by mothers. On the other hand, I have seen it seriously stated that crying does babies good; that crying babies are invariably strong babies with abnormal vitality, while good babies who don't cry become anæmic and die!

Now it is certain that newly-born infants who

[1] *Loc. cit.* pp. 37, 38.

are weak, and perhaps immature, do not cry much for the reason that their lungs are imperfectly expanded, and there is little air entering and being expelled from them. Moreover a good lusty cry in a newly-born baby is a good sign, showing that its lungs are well expanded and that it is of good vitality.

A moderate amount of crying cannot do much harm to an infant, but it is of importance that its nurse should try and find out the cause of the crying, and endeavour to soothe it or divert its attention from its trouble. On the other hand, it is far better to let it cry if it is petulant and spoiled rather than to let it have all its own way.

While crying from temper cannot do much harm, even to a sick child, yet continuous crying from sharp pain does unquestionably tend to exhaust and depress.

This leads on to the question, often a difficult one, of deciding where the seat of pain is. The infant has not the intelligence to localise the pain, and indeed children of four or five years old will often be unable to point out the painful spot, and will, for instance, confuse 'toothache' and 'earache.' It often happens to medical men and nurses to feel sure that the infant is in severe pain, yet they are unable to decide if the pain is in the abdomen or in the chest or ear.

It sometimes occurs, especially to children of from nine months to two years of age, that they have a 'catch in the breath' on commencing to cry. This is liable to take place after a fall or sudden fright. In most children there is a short pause after drawing in the breath preparatory to a good loud cry ; a lengthening of this pause from fright or temper produces a temporary pallor of the cheeks, or the face becomes

bluish, then the cry bursts out and the 'catch' is over With any sudden emotion, such as a fright or excitement, the individual is 'chained to the spot' for a moment, that is, while the stimulus is in excess the whole muscular system is thrown into a state of contraction, and as a result no movement takes place. This seems to be the case with the muscles of respiration, and for the moment the breathing movements are stopped. Children who are subject to these catches in the breath want very carefully guarding from all forms of excitement, or sudden frights (*see* p. 133).

Anger.—Very early in life, mostly within the first two months, the petulant, impatient cry of anger is heard. The infant expects the maximum amount of attention from his attendants, and if left to himself resents their neglect. Then the bathing, the towelling, the dressing operations, the administration of a 'powder,' or castor oil—all give occasions for display.

Mrs. Moore noted that on the fifty-fifth day displeasure was indicated 'by hard crying and rigidity of the whole body, which was so complete that, if taken up by the hands, he could be raised to his feet without having bent the vertebral column and lower limbs.' On the eighty-seventh week, 'in fits of temper which were produced by attempts to force his clothing on the child, and to make him go in a given direction, he struggled and bit.' [1]

Anger is doubtless instinctive; the disposition to displays of temper on provocation is derived from our savage ancestors. Savage nations are much more irascible than races of more intelligence, which have been disciplined by the experiences of civilisation.

[1] *Loc. cit.*

Babies and children differ much from one another as regards the ease with which their temper is ruffled; some displaying an almost angelic temperament, and others easily giving way to tempers and paroxysms of rage and fury. As they grow older, when angry they will stamp and dance about or throw themselves on the floor and kick and scream. With some the storm is quickly over, but in others it is not easily subdued, or it passes into sulkiness. Time and judicious training work wonders even with the most irascible little furies.

Pleasures.—The infant at birth is far less demonstrative in the expressions of its pleasures than it is in the expressions of its pains and discomforts. Smiling and laughing have to wait the dawn of intelligence, while crying is common enough from the first hour. The chief pleasure at first is relieving the discomfort of hunger. Sucking at the breast or the teat of the feeding-bottle will at once stop the cry or fretting caused by hunger. Sucking at one's finger or a dummy teat will have the same effect for a short time. Various vague discomforts, such as indigestion, are soothed away and forgotten by taking food or sucking at a teat, but the distraction is only temporary, and the cry begins again.

Later the infant appears to take pleasure in its warm bath, and when lying undressed in a warm atmosphere it will kick and 'crow.' For the first few weeks its pleasures are rather those connected with the cessation of discomforts than of any active enjoyment.

Smiling is not usually noted in infants for the first six or seven weeks. Darwin records the first smile in one of his infants on the forty-fifth day, and

on the hundred and thirteenth day the smiling was accompanied by little noises, and a sort of incipient laughter. Mrs. Moore noted smiling in her infant as early as the sixth day, when it was comfortable and in a good temper. Most observers, however, have treated these early smiles with some amount of suspicion, and have refused to allow that they were genuine. Boisterous laughter is not usually seen and heard till the third or fourth quarter of the first year; at this later time the child will be convulsed with laughter when its toes are tickled or it is playing 'peep bo.'

'Cooing' and 'babbling' are other ways in which an infant shows that it is in good humour and in happy mood. Vigorous kicking and a sort of jerky movement of the limbs and body take place in strong and pleasurable excitement.

It is obvious that sights and sounds give rise to pleasurable feelings; the face brightens as the attention is attracted by coloured pictures or music. When out in its carriage it will watch animals or moving objects with the greatest interest. Pleasure comes also with increasing intelligence and the newly found powers of seizing and locomotion. What amount of pleasure the child derives from its toys and in play every mother knows.

Astonishment.—By six months old, when the infant has had some experience of the nursery world and some practice in making observations, it begins to show signs of wonder and astonishment at any unusual incident or the intrusion of a stranger. The attention is fixed, the eyes open wide and stare at the stranger, the lower jaw drops, and the fingers of

both hands are spread out and extended. Then, perhaps, the child turns to its nurse to try and read her face and make out what she thinks of the strange apparition. The position of the spread-out fingers is characteristic. Something strange or startling happens, or there is a loud noise which attracts the infant's attention, and immediately the hands are raised and the fingers and thumb of both hands are spread out. In later life, as Darwin points out, when astonishment passes into fear, the fingers are spread out in the same way, but the hands are raised to the level of the shoulders or head as if to ward off an attack.

As the child gets older and is able to speak it will express astonishment by calling out or exclaiming; but gesture plays a prominent part in the expression of children's feelings, as any one will see who watches their faces at a pantomime or circus.

Fear.—Infants at first do not show any signs of fear, as a certain amount of intelligence is necessary, not only to appreciate danger, but to be alive to the presence of strange objects. When a few months old, loud noises will often cause them to start and blink. Nurses will often say that an infant is timid or nervous because it starts or trembles at loud noises, or when moved quickly up and down in the nurse's arms. This can hardly be fear, in the ordinary sense, it is evidence of an over-sensitive state of the nervous system, perhaps associated with ill-health.

Infants of six or eight months old will evince a fear of falling if moved quickly in the arms up and down, and will clutch tight hold of the nurse's dress. This cannot be the result of experience as they have never fallen. Presumably it is an instinctive dread. In the

same way they will cry and shrink away from a dog or cat, and this can only be the result of instinct. The infant will cry and turn away its head if a stranger offers to take it, and hide its face on its mother's shoulder. Champneys noticed that his boy showed signs of fear when nine months old, and a month later was afraid of a toy which made a squeaking noise on being squeezed.

How nervous many children are of strange animals is well known. They will shriek and cling to their nurse or mother at the approach of dogs or cats, cows, geese, &c., though they have never experienced any evil effects from being near them. Loud noises, especially when sudden, affect most children ; the beat of a drum, railway whistles, the report of toy guns are instances. Some children have to be taken into the waiting-room of a railway station till the train has drawn up, as they cannot bear to see the approaching train. Children even of three or four years of age are sometimes so frightened of railway travelling that their faces have to be covered up the whole way, and even then they start whenever the engine whistles.

Children are apt to be frightened on waking up, and for this reason it is never wise to arouse them roughly. This occurs mostly after the comparatively short sleeps taken during the day, rather than after a long night's rest.

Some children, from the age of about three years and over, are subject to what is called 'night terrors'; they will perhaps suddenly sit up in bed and scream, with abject terror written on their faces ; they apparently see some frightful object of which they are in dread. This may be momentary, or the display may

last for several minutes, but very probably they have no remembrance of the affair in the morning. As these terrors are allied to dreaming, great care should be taken not to read gruesome stories or excite the child overnight. Children will also awake their attendants in the night and tell them they have had bad dreams. Thus a boy of five years old awoke his mother in the night to tell her that he had dreamt 'there was a ferret inside him!' He had sufficient sense to know it was not true, and to refer the unpleasant experience to a dream. He had had some experience of the ways of ferrets, weasels, and the like, in the country some short time before, and doubtless unpleasant sensations in connection with indigestion suggested the movements or the gnawing of these animals!

While 'night terrors' and terrifying dreams are allied, they differ in some ways. In the former the child is unconscious from first to last of the presence of his friends or surroundings, but his attention is riveted on some frightful apparition which appears before him. He is deaf to the pleadings of his friends who endeavour to quieten him. Then comes a more or less quiet sleep, and except for appearing to look exhausted next morning he is all right, and can give no account of the startling apparitions of the night. 'Day terrors' are much rarer than 'night terrors,' but occasionally children will see apparitions in the full light of day. Bad dreams torture some children, and lead to disturbed sleep both for themselves and their bed-fellows.

CHAPTER XVI

MENTAL DEVELOPMENT OF THE INFANT (*continued*)

Learning to Talk

NO chapter amongst those which record the history of the child's early years is of more interest and importance to the mother, nurse, or psychologist, than the chapter which records the infant's first attempts to express thought by means of speech. The struggle to gain a mastery over our language is a prolonged one, and extends far beyond the years of infancy ; and this is not surprising when we remember how slowly the infant's intellectual powers are developed, and that no advances can be made towards the acquirement of speech until a high degree of intelligence has been attained.

The child can make no progress in intelligent speech until a considerable advance has been made in the development and education of the higher nerve centres in the brain, where ideas of the external world are formed, and which are, so to speak, the centres concerned in the operations of the mind.

It is said that a perfect English dictionary would contain some 100,000 words, and that an ordinary educated individual makes use of 20,000 words in

conversation. The infant of a year old usually cannot use a single word intelligently, and at two years of age he has, perhaps, a vocabulary of several hundred, and is just beginning to put together a word or two to form simple sentences.

When we remember this vast number of words to be learnt and used aright, with their often ambiguous meanings, we can easily appreciate the task the infant has before it, and the great intelligence that must be brought to bear in mastering it.

No child can learn to speak who is born deaf, for if it cannot hear spoken words it has no copy before it to imitate. Thus, children born deaf are dumb, that is, are deaf-mutes. Even partial deafness interferes with the child learning to speak.

But, as I have already pointed out, something more than acute hearing is required if the child is to learn to give utterance to its thoughts. It must be able to form ideas before it can give utterance to them. It must not only be intelligent enough to learn the names of objects, and to understand what is said to it, but its mental powers must be active and energetic enough to throw into operation the nerve-muscular apparatus which produces articulate sounds, and correctly copy the sounds heard.

To learn to speak, there must be (*a*) a perfect hearing apparatus to transmit the vibrations of sound to the nerve centres; (*b*) nerve centres which translate vibrations of sound into ideas; (*c*) nerve centres which convert ideas into motor impulses throwing into operation the organs of speech. If there is failure in any link of this chain, the child will be unable to speak intelligently.

The ignorant mother, whose child fails to speak at the proper stage, thinks only of the tongue, and jumps to the conclusion that this only requires to be 'cut' in order to enable it to speak fluently. In all such cases the weak link is either in the sense of hearing or in the brain.

We may usefully follow Romanes, and trace the evolution of speech in children in the following stages :—

1. Articulation as an instinctive or random exercise of the speech organs.

2. Meaningless articulation, the result of imitation.

3. The understanding of the significance of articulate sounds or words spoken.

4. The intelligent use of speech.

1. Articulation as an instinctive or random exercise of the speech organs.—Towards the end of the second month of life, if the infant is healthy and strong, we begin to notice the baby 'twitterings,' 'babblings' or 'cooings,' which it indulges in when in a happy and contented mood. The stimulus provided by a feeling of comfort or pleasure finds an outlet in the movements of the muscles which operate on the speech organs, and sounds are made which are suggestive of vowels and consonants. The random kickings and jerkings of the body and limbs, already referred to, are instances of the same form of stimulus, only flowing in another direction.

At first the cooings and babblings are hardly distinctive enough to suggest articulate speech, but later, perhaps by the fourth or sixth month, both vowels and consonants can be distinguished by the attentive observer, in the act of screaming and

crowing. It is safe to say, however, that, during the first six months, by far the greater number of sounds made by an infant are not easily recognised or can be represented in print.

Later in the first year many sounds, such as *mum-mum*, *nan-nan*, *am-ma*, can be distinctly recognised, the child repeating them over and over again, and evidently pleased at being able to do so.

It is difficult to say if some of these word sounds are instinctive, or whether they are imitated or picked up from the nurse.

It is curious to note that, in rare instances, twins brought up together have been known to evolve a language of their own, which no one but themselves could understand, and which reminds us very much of the language of animals. Monkeys, birds, and other animals appear to communicate with one another by means of language. Buckman tells us that he has distinguished twelve different words in the language of fowls, some half dozen in the mewings and scoldings of cats, and at least five in the animated conversation which goes on in a rookery in the spring time. He has noted *ark*, *wa*, *waor*, *ah*, *awa*. The wild fowler learns the calls of different birds, and by imitating these calls is able to bring the birds within range of his gun. Dogs certainly express their different states of feeling by modifying the tones of their barking.

It is probable, however, that instinct does not play a large or important part in the acquisition of language by the infant; infants learn to speak by imitating those around them. Deaf-mutes have sometimes been cited as making articulate sounds which they could not

have learned by imitation, but this is not the general experience I believe. The noises they make have little or no resemblance to articulate language.

2. Meaningless articulation, the result of imitation.—Imitation plays a very important part in the education of the infant. The infant unconsciously imitates what is going on around it, very much as older children and adults pick up a brogue without trying to do so, or being aware that they have done so. From the earliest moment of an infant's life the mother and nurse talk to it, sing to it, and pour into its ear long strings of loving words, of which it is needless to say it cannot understand a single syllable.

When some months old it begins to 'jabber' in imitation of the talk which it hears, much in the same way that a child of, say, eighteen months, when he gets hold of a pencil, scribbles away on a piece of paper in imitation of writing, but does not make a single stroke correctly. I have sometimes seen children in hospital, of one or two years of age, who cannot say a single word intelligibly, being backward on account of poor health, sitting up together on a bed apparently carrying on a busy conversation in 'jabber' and sign making, no intelligent word being spoken, the whole performance being an imitation of the talking they have heard around them. Often words or syllables will be copied from the nurse or other children, and frequently repeated without the child understanding the meaning; it has learnt the words exactly as a parrot learns. Thus *oh, dear*, will be copied from the nurse, or *tata*, and everybody and everything is *tata*. Such words may be dropped after a while, and some others substituted. Random articulation, and articula-

tion the result of imitation, are doubtless of value as exercises for the speech organs, and to prepare the way for the latter being called into play under the direction of the will.

3. **Understanding the significance of articulate speech.**—With the understanding of the meaning of some spoken words the infant is coming to close quarters with its task. The ability to understand spoken language precedes by some months the ability to speak. The infant has the ability to understand what is spoken, but it has not the power of utterance of what is thought.

During the second half of the first year much advance is made in the reading of the mother's face or gestures. It will smile, or laugh in response to the mother's smile, and can read its nurse's face in a moment and tell if she is angry. During the last months of the first year it recognises a few words, and correctly attributes their meaning. Before this can happen it must have recognised and become familiar with the objects themselves. It recognises the cat, it has seen and stroked it ; it has seen, felt, and probably tasted its own toe ; it has formed ideas of these objects, they are familiar friends. After a while the word 'pussie' which it hears becomes associated in the child's mind with the cat. The nurse says : 'Where's pussie'? at the sound of the word the appearance of the cat is recalled to the child's mind, it looks under the table or round the room for the domestic animal, and its face brightens when it sees the cat. Nurse says : 'Where's baby's toe'? and so forth; and the familiar objects are pointed out. But as yet the child makes no attempt to speak the word

it hears ; it prefers to point or shake its head, or make use of gestures and signs. Towards the end of the first year and on into the second the infant is fast picking up the names of various familiar objects, but as yet cannot say the words themselves.

It is interesting to note that some animals reach this stage of intelligence—they learn their own names, and also the names of many things and actions. Thus apes have learnt to understand short sentences and also numbers ; the retriever learns the meaning of 'seek dead,' 'go to heel' ; the intelligent fox terrier can be taught to 'trust,' and the meaning of 'paid for.'

Children who are backward mentally, reach a stage of intelligence in some cases in which they understand a good deal of what is said to them, and yet may be unable to speak intelligibly. They can run errands and fetch things when told to do so, and yet they cannot make themselves understood by means of language. Thus one boy of nine years old, who had a brain injury at the time of his birth, and who is fairly intelligent and understands a great deal of what is said to him respecting familiar persons and things, cannot speak a word that can be understood by a stranger, though his friends can understand the meaning of the signs he makes. If asked his name, he knows at once what is wanted, and he will rummage among his toys or books and show you his name written on the lid of a toy box, or in a book, with an expression on his face which plainly means 'see for yourself.'

4. **The intelligent use of speech.**—It cannot fail to be noted that meaningless articulation does not require any high order of intelligence, for the parrot

and also the imbecile child can jabber and chatter to any extent.

A higher order of intelligence is required to understand the meaning of words spoken, and in this respect the child of eighteen months is on the same intellectual level as the well-trained retriever, chimpanzee, or feeble-minded child of older years.

The difficulties to be overcome in learning to speak intelligently need a high order of intellect, and a sustained effort of attention such as no animal below man's level possesses. In a sense it is like learning to play in a really efficient manner on the violin, where much time, patience, and natural talent is necessary. Lateness in learning to talk, assuming there is no deafness, means late mental development, and if by the age of five or six years the child fails to talk intelligibly, it is only too likely that there is some brain defect, or in some way or other there is mental feebleness.

I have already noted that the child is fond of making certain articulate sounds, the vowel sound 'ah' being commonly preceded by *m*, *n*, *t*, *d*, or *p*, or *b*. These random articulate sounds take the form of *mama*, *nana*, *baba*, &c., probably because they are the easiest; and both English and Continental children use them in preference to the other consonants at first. After awhile, usually about the beginning of the second year, the child begins to apply them, either rightly or wrongly, to familiar persons, or to signify an action, as in going out. Sometimes it is a sort of echo, as when the nurse says '*Where's mama?*' the child says, '*mama*'; or '*Where's baba,*' and the child says '*baba.*' Buckman

points out that *ah* is the result of an expiratory effort, with the mouth widely open, and if the infant wants to make the loudest noise possible, the lips are closed, then burst open, while some of the confined air passes through the nasal cavities, and *mah* is produced. He ingeniously suggests that as the result of this loud cry the mother appears, and the infant learns to associate the mother with the word *ma*. Probably in most cases the infant is taught that *mama* stands for mother, *papa* for father, *nana* for nurse; I am inclined to think that this is so in most nurseries.

For some time, at any rate, these familiar words are often used wrongly, even after knowing that *papa* means father; every man is *papa*, every woman either *mama* or *nana*. It is curious to see how the child makes its vocabulary go a long way by extending the signification of words; *baba* is baby, *ba* is ball, *ba* is a sheep, and a goat is a *ba*, because it is like a sheep; the moon is *ba* because it is round. A little girl gets a bump, and then calls all bodily pains *bump*, *bump*. The receptive experiences are much wider than the motor attitudes.[1]

During the first few months of the second year the vocabulary of words understood is increasing fast, but the number of words spoken is still very scanty. By the fourteenth or fifteenth month the child will know the names of all the members of the family, common articles of food, the furniture of the room, his own body; but very likely *mama*, *dada*, *nana*, *tata*, perhaps *ba* for ball, *poo* for pussie, will be among the very few words used. He is

[1] Baldwin, *loc. cit.*

almost certain to make a good deal of use of gestures and signs. It is not often that he is in a teachable mood, and it is difficult to get his attention for long together.

Nearly all the words used are two-letter words, and many of them are reduplicated, like *bow-bow* for dog, *moo-moo* for cow, and *num-num* for eating. There is a tendency also to add the terminal *y* or *ie*, so that biscuit becomes first *bik* and then *bikky*, *dick* for bird becomes *dicky*. Inconvenient letters are constantly left out, this may in some instances be the result of not catching the right sound by the ear, and so imperfectly pronouncing it.

By two years of age the child has a fairly large vocabulary, for during the last five or six months of the second year, he has been making great progress. Mrs. Moore[1] records that her boy had a vocabulary of 475 words at the end of his second year. These included 306 nouns, 92 verbs, 32 adjectives, 14 adverbs, and 11 pronouns. This is, I should say, an exceptionally good list. Most of the nouns were the names of persons or common objects about the house or animals. A little boy I know had a vocabulary of 300 words at eighteen months; but this is unusual.

We find, about this time, that words have to do duty for sentences, when aided by gestures and signs. Thus *up*, with a beseeching look and arms extended, clearly means, 'I want to be taken up and jumped about'; *man*! with a look of surprise on the child's face and his fingers spread out, plainly means '*Look, here's a man!*'

But very soon miniature sentences are formed,

[1] *Loc. cit.* (p. 130).

two or three words are strung together, being a sort of easy contribution to the difficult art of 'sentence building.' Two nouns, adjective and noun, or noun and verb, are the commonest combinations at first. Thus Preyer's boy's first sentence was *home milk*, as he was returning home on a hot day in a thirsty state. *Ken good*, *papa come*, *milk hot*, are examples of first sentences. The flights soon get more ambitious. Thus a little boy of two years is ill; the doctor has been and looked at his throat. When the latter has gone, he tells his mother '*Naughty man*, *spoon*, *mouth*.'

Children of about two years of age are apt to invent names for themselves, or their friends or familiar objects, which remain as household words. Many of these inventions are nothing more than incorrect attempts at pronouncing the real names. Thus a child calls his sister, *titter*, and afterwards abbreviates it into *tit*; here is simply a failure to pronounce the *s* and substituting *t*. Margaret is christened *Gretty*, the *gret* seized upon, and *ty* added. It is not so clear why a little boy called his brother *Cark*, his father *Bammy*, and his mother *Der*. Mrs. Moore records how her little boy of nineteen months christened the cat *lum*, and his own shadow, which he took great interest in, *bizz*. Many of these words stick for years, others are quickly dropped out of use.

At this age the child is very apt at picking up bits of nursery rhymes, which he is never tired of hearing his nurse repeat or read from a book. He has his favourite picture book which illustrates them, and from time to time he wants to be shown the

pictures and hear the rhymes. Presently he remembers a bit here and there, and will say the last word or two if the nurse stops short. Probably, in most cases, he has little idea of the meaning. In the same way he will remember phrases and long words, applying them in a way that was never intended. He has his bright days and his dull days; some days he appears to take in everything and will recite what he knows, while at other times nothing will induce him to show off.

I have already referred to the fact that certain consonant sounds are exclusively used in the first attempts at speech. Curiously, nearly all, if not all the consonant and vowel sounds, may be heard during the babbling period; but there is a marked selection in the attempts at speech. The first consonants used are the 'explosives' of the first stop position (when the stop is at the lips)—*p*, *b*, *m*; and the corresponding consonants of the second stop position (when the stop is made by placing the tip of the tongue in contact with the palate behind the teeth)—*t*, *d*, *n*; these are mostly used in association with *a*, as in *mama*, *papa*; or *ee*, as in *bee-bee*, and later with *oo*.[1] A month or two later, often towards the eighteenth or nineteenth month, the corresponding consonants of the third stop position (when the stop is made by the back of the tongue and roof of the mouth) are used—*k*, *g*, *ng*. Now we hear, *come*, *gone*, *quack*. Sometimes these appear to give much trouble, and for some time we have *tome* for *come*, and *dood* for *good*. Somewhat later still, the labio-dentals, *f* and *v*, are correctly used,

[1] *See* Appendix.

and also *w*, *sh*, *ch*, *y*, and the aspirate *h*. Amongst the most difficult are, *th*, *r*, *l*, *s*. During the third year we constantly find *f* used instead of *th*; thus *bath* is *baf*, *something* is *somefing*, *w* or *y* is substituted for *r*, as *wun* instead of *run*, and *yats* does duty for *rats*.

S is often omitted if inconvenient, or in some cases *ch* does duty for it; a little boy of two and a half used to say *chignal* instead of *signal* when watching railway trains. In more uncommon cases, *f* is the stumbling-block; one small girl of three years used to say her uncle *hunted wolves and choxes!* Both *th* and *r* long present difficulties, *three* is constantly *free*, and *w* has to take the place of *r* many times and oft.

The same difficulties occur when the consonants are at the end or in the middle of a word. Thus, in *fly* the child will sometimes omit the *l*, or at other times the *f*, making *fy* or *ly*. In such words as *open*, we often have *oken*, or *mound* becomes *mounge*. In most of these cases the child does not catch the sound properly, especially the termination, and makes more or less of a guess at it.

As time goes on the child gradually learns to correct its mistakes; it becomes aware of the mistakes it is making by comparing the sound of the words as spoken by others and by itself, and presently copies them aright. Most children who are brought up among educated people pronounce their consonants fairly correctly by the time the fourth year is reached. That this is not so among the less educated classes any infant schoolmistress will testify. Backward

children and those who are feeble mentally long retain their 'baby language.'

Many misinterpretations and confusions of words occur long after this period, and indeed all through early childhood, and many comical instances of this will occur to every one. Thus, at a breakfast-table, an adult is asked if she may be helped to a *kidney*; a little boy of four years childlike announces that '*he won't have any kitten*'; immediately his sister of eight years corrects him: 'You silly boy, it isn't *kitten*, it's *kidney*, the *young of the goat!*

CHAPTER XVII

BACKWARD AND MENTALLY EXCEPTIONAL CHILDREN

Backward children.—It is a common experience that some infants and children are quicker and more forward than others, quite apart from any question of ill-health or defective development; a slight amount of backwardness may occur during infancy in healthy children, who turn out eventually to be in possession of brains well up to the average. On the other hand, a precocious intellect is not always a desirable possession, as it is often associated with a more or less unstable nervous system. In any case there need be no anxiety if the infant is a month or two behind the average time in learning to walk or in understanding what is said to it.

A common cause of backwardness during early life is ill-health. Long-continued illness during the first year, especially if the digestive system suffers, is very likely to render the infant backward, and consequently it is late in learning to sit up by itself, walk alone, and talk. Many instances of this kind may be seen in hospitals, where the patients are recruited from amongst the poorer and most ignorant classes of our large cities. In these cases, however, the

backwardness disappears sooner or later as the health is regained.

Backwardness is especially likely to occur if the child suffers from rickets. In a well-marked case of rickets, say in a child of a year or a year and a half old, the child is unusually pale, the head is large and square and more or less flattened on the top, the bones at the wrist and ankles are enlarged, the ribs are 'beaded,' there is often more or less curvature of the bones of the lower limbs. Such children are late in cutting their teeth, and in learning to walk and talk. It is not uncommon to find rickety children of two or three or more years of age, who cannot walk, and whose lower limbs are weak and the knees and ankle joints loose. The same class of children may be seen, when older, of low stature, with large heads and knock-knees, with slow and backward brains, attending board schools among the 'dullards.' Rickets in its most severe form is apt to dwarf the body and retard the development of the mental powers. In milder cases of rickets there may be only slight backwardness, which disappears as growth proceeds, and such children probably become perfectly normal in health and strength.

Backwardness, both in the growth of the body and of the mind, occurs in connection with the curious disease known as congenital myxœdema or cretinism.

So far I have only spoken of backwardness as a result of bodily ill-health, and which is comparatively slight in degree, but the most serious forms of backwardness are the result of retarded or arrested development of the brain. In most of such cases

the retarded development dates from before birth; in a few cases the arrest of brain development is the result of some brain injury at the time of birth or during infancy. All degrees of mental feebleness may occur, from slight dulness to complete idiocy.

Evidence of mental feebleness is necessarily wanting during the first few weeks of life, and indeed during the first few months it may not be very definite. By the end of six weeks or two months the infant should be giving some evidence of a 'mind-awakening,' its face brightening when it wakes up, smiling in response to its mother's smile, watching moving things around it; but if it remains perfectly passive, makes no response to its mother, no attempt to raise its head or takes no notice of moving objects, some mental backwardness will be necessarily suspected. It does not perhaps 'coo' or 'babble' like a normal healthy child, nor indulge in vigorous kicking. In such cases the parents and nurses are apt to think that the infant is deaf or blind, but if the child starts at a loud noise, or blinks when a strong light comes near its face, there is not likely to be much the matter with its hearing or sight.

As time goes on, the child perhaps makes no attempts to hold up its head, or to sit up, but remains perfectly limp, lying on its back, taking no interest in sights or sounds. If this condition of things is present at six months of age, there will be much reason to fear that there has been some arrested development or defect of the brain.

The shape of the infant's head may perhaps help in coming to a conclusion. The head may be abnormally small, the circumference measuring

perhaps at six months 13 or 14 inches instead of 17 inches.[1] It may be misshapen, being small in the front region or at the back; it may be a long head, or the two sides may not be alike. But too much stress must not be laid on the shape of the head, as good mental power may be associated with moderately small heads. Frequent convulsions are always a bad sign, if there is at the same time mental dulness. In some cases, where there has been a brain injury during the act of birth, there may be some stiffness or rigidity of the lower or upper limbs. Children who have unquestionably well-shaped heads of normal size may be weak minded; these cases, however, are usually not congenital, but there has been some injury to the brain as the result of disease at some time during infancy.

In the worst class of case, months and even years may go by during which the child remains in much the same helpless condition. The body perhaps grows and develops fairly well, the appetite is good, but there is a general condition of mental apathy which cannot be mistaken.

In the majority of cases, if not during the first year, at least by the end of the second, there are signs which make it appear that the mind is at last awakening to some extent. In many of these cases the child shows some evidence of temper and is only quiet when asleep or feeding, it requires a great deal of attention on the part of its nurse, and is in consequence a heavy drag upon the attention of the mother if she has but little help and much household work to look after. And it is often heart-breaking

[1] *See* Appendix.

for her to see that, in spite of so much attention, the child takes but little notice of her. and goes to a stranger just as well as to herself, and that it appears not to mind at all as long as it is comfortable and its wants supplied. But some mental improvement comes sooner or later ; the vacant look and utter disregard for its friends hitherto shown gives way to a brighter aspect, and it will perhaps watch more attentively with its eyes any movement going on around it.

It may make some attempts to turn over in its cot or raise its head, or its mother at times, by dint of coaxing, can get a sort of a smile on its face for a moment. With this improvement, there is probably a good deal about it which suggests mental backwardness. It will slaver or dribble long after the usual time when children learn to retain their saliva in their mouths, and as a consequence its clothes in front are constantly being changed. It is late in learning cleanly habits, and the napkin is retained as a necessity after other children of the same age have given it up.

Very likely by three or four years of age it will have learnt to crawl and to get about the room from one place to another. Its tastes are apt to be strange and uncanny ; thus, one little boy used to crawl from one part of the room to another in order to lick boots ; another boy would eat holes in his clothes. The appetite is apt to be uncertain, and things will be eaten that no normal child will touch. Such children are a long time before they will take notice of living objects, as dogs, horses, cats, or vehicles moving in the streets. They care very little or nothing for picture books or toys, but perhaps make a favourite of some odd thing as a comb or a brush. It will be late

before they can understand what is said to them, and many months will go by before they can use a single word of articulate speech intelligibly.

In many other cases the mental feebleness is far less marked than in those just referred to. Thus an infant may be only a few months backward in showing some signs of intelligence, and as it grows up it is not far behind other children in taking notice of domestic animals. It is late in learning to walk, perhaps it is two years old before it can stand alone. At this time it probably cannot say a single word except unmeaning syllables. It is clumsy with its hands, it cannot play with toys as other children do, its attention cannot be retained for even a few moments together, it is self-willed, and shrieks and cries if interfered with and not allowed to do just as it likes. Such children tax all the patience and all the energies of the nurse or mother, and they are very apt to be made worse than they really are by injudicious indulgence. They are always on the 'go' and constantly in mischief and cry vigorously when caught and brought back to safer regions. It is difficult for a stranger to make friends with them, and they treat their nurse and mother in the most nonchalant manner. They are often good mimics, and understand much of what is said to them. Talking is the great crux—they are late in learning to say even 'mama' or 'dada' and other simple words intelligently. They may have ideas but they make no attempts to translate them into words. This not speaking is often a mystery to their parents, who have an exaggerated idea of the child's intelligence, and cannot appreciate the difficulties in the way of expressing thought in language.

Learning to speak tests the mental powers of a child more than anything else, and there is a delay of years in some cases before the difficulty is overcome. Assuming that there is no deafness, lateness in learning to use words intelligently points almost certainly to mental feebleness. In such cases other childish characteristics are exceedingly likely to be observed. The saliva is very apt to escape between the lips, there is usually a difficulty in concentrating the attention, and there are but weak powers of self-control.

Even after the backward child has learnt to use a number of words, or even form sentences, he long retains his childish ways as regards language. He frequently 'echoes'—that is, when asked a question, he simply repeats the question or the last word of the sentence. He finds it so much easier to imitate than to put his own brain and muscles concerned in speech into action. He long retains 'baby-language,' slurring his words and substituting easy consonants for difficult ones, or speaking with great indistinctness.

Mentally exceptional children.—Under the head of 'exceptional' children come a number of oddments, which defy classification on account of the numerous varieties met with; they cannot be included under the head of 'backward' or 'mentally feeble,' inasmuch as they are often clever or indeed brilliant in some respects. They must be carefully distinguished—this is often difficult—from merely spoilt children, though it is quite certain that injudicious training is exceedingly likely to aggravate their abnormal dispositions. The class to which I refer are possessed of some mental abnormality derived from inheritance

which takes different forms, but which often consists of a want of emotional self-control, or perhaps there is an excessive excitability of the brain and nerves, or there is an exaggeration of some childish characteristics, which, in normal children, disappear as age advances. There is, perhaps, an unbalanced condition of mind, which fails to distinguish between the relative importance of things, and the child earns a character for having every sense except common sense. In some cases there is a lack of moral sense, for as the child grows up—in spite of good influences and examples—he fails to distinguish the difference between truth and falsehood, right and wrong, his neighbour's goods and his own goods.

Children with these 'minor mental abnormalities,'[1] are comparatively common, but they differ much from one another in many respects, and there are all degrees of mental abnormalities to be met with. In the worst class of case, it must be tolerably clear to an unprejudiced observer that if the child is allowed to go on unchecked by discipline and training there is great risk of a complete mental breakdown taking place before adult age is reached. Parents are often the blindest of beings as far as anything concerning their offspring is concerned, and they have great faith in procrastination and think that any frailties their child is subject to will disappear as time goes on.

In the slighter forms of mental abnormality, the future outlook may be bright if suitable discipline is applied in good time and good influences are brought to bear on the child.

A few more or less typical cases may be referred

[1] See Trüpper, *Psychopathische Minderwertigheit.*

to which will serve to illustrate some of the various types met with.

There are some children born with a morbidly excitable nervous system and weak powers of self-control. This tendency runs in families and it is undoubtedly intensified by the conditions of modern life. The hurry and worry incident to business, excessive brain work, and anxieties of all sorts and kinds tend to conditions of 'neurasthenia.' Neurotic men and women have neurotic children, and we see in the children the effects of hereditary disposition, intensified by the example and influences of their parents.

This nervous irritability shows itself in many ways in the infant, but it is more marked during early childhood. Such infants are precocious, bright, and lively; they are easily excited, and the excitement is followed by depression. They are pleased at being noticed, are easily frightened and readily give way to tempers. They grow up into bright and attractive children and are likely enough to be completely spoiled. They often exhibit morbid tastes, suck the sheets of their cots, bite holes in the blankets, and although brought up in refined families are apt to give way to vicious and depraved habits. They suffer from all sorts of pains and aches, especially if they overhear, or are told about some one who has been ill; they are often born actors and mimics and will rehearse or act the fairy tales which have been read to them. They are made infinitely worse by the weakness and folly of their parents, who take them at Christmas to all the pantomimes and perhaps allow them 'on account of their cleverness' to take part in some play for the benefit of a charity! For this class of child

dolls, bricks and games have no charms; fairy tales, finery, excitement of some sort are far more in their line. When bedtime comes they cannot keep their brains quiet, there is no sleep to be had, or sleepiness is long in coming. There must be a light in their room, every few minutes they are calling for their nurse to settle the bedclothes, or any excuse is good enough to get her into the room. When scolded and told to go to sleep, they burst into tears or scream till the whole household is disturbed. They probably get their own way in the end and rule their parents and attendants with a rod of iron.

While girls suffer more than boys in this way as a rule, yet boys at times will suffer from an abnormal excitability of nerves. One small boy professed at times that he could not bear the least noise; opening and shutting scissors, poking the fire, moving a chair, would make him put his hands to his head and complain that he could not bear it. He would not walk because he said it hurt his legs, he would refuse his food for a whole day, and then perhaps overeat himself the next. He was the dominant factor in the household and no one was allowed to stir for fear of disturbing him.

Some of these children are morbidly sensitive in their feelings, they will burst into fits of uncontrollable weeping because some one has said something which has hurt them; they will not explain but will sob and mope for hours together in a thoroughly miserable way. They have an excessively irritable skin and a great dread of being hurt, they will cry if touched, they cannot bear to have their throats looked at, and are always in terrible dread of the approach of a

doctor who they think is going to circumvent them in some way.

With some children there is a disposition from earliest infancy to be passionate and to give way to violent tempers. At any little disappointment they fly into a passion and stamp with rage, throw themselves on to the floor and behave like one bereft of reason. It is difficult to pacify them and get the excitement under control. They are very likely badly behaved to other children, rude to friends and cruel to animals; at any attempt to punish them they fall into a fury and fight and shout till they are exhausted. They are a source of anxiety to their parents and a byword among the neighbours. Such children often suffer from epilepsy.

Several writers have pointed out [1] that there comes a stage in a child's life, when it begins to show a tendency to contrariness which it has not exhibited before. This perhaps may first happen in the second or third year; for instance, a certain course of action is suggested or demanded, and at once the child proceeds to do the exact contrary. The child appears to derive pleasure in doing the opposite to what it is wished to do. This tendency may show itself in a number of ways, in diet for instance; one kind of food will be eaten with a relish one day, and the next refused from some whim or other. The morning's walk is suggested and at once there is a storm and floods of tears. The roads are dirty and the child is requested to pick his way and avoid puddles, whereupon he shows an especial pleasure in wading through every puddle and every muddy spot to be found. In

[1] *See* Baldwin, *loc. cit.* p. 145.

the majority of children, this tendency disappears when the influences around are favourable.

This tendency to do the opposite to what is suggested may be noted at times in all children, and in adults too for that matter, but some children display it to a marked and tiresome degree. They are always at war with their nurses, they refuse to be dressed or be bathed, then there is an uproar, and things are made worse by their being allowed to get the upper hand for the sake of peace and quietness. They make bad playmates for other children; and through life they are always in the minority.

Some of these contrary ones remind me of Mark Twain's description of the Australian magpie. He says: 'I was acquainted with a tame magpie in Melbourne. He had lived in a lady's house several years, and I believe owned it. The lady had tamed him, and in return he had tamed the lady. He was always on deck when not wanted, always having his own way, always tyrannising over the dog and making the cat's life a slow sorrow and a martyrdom. He knew a number of tunes and could sing them in perfect time and tune; and would do it, too, at any time that silence was wanted, and then *encore* himself, and do it again; but if he was asked to sing he would go out and take a walk.'

Of the many other forms of mental abnormalities seen in children, space will not allow me to speak. I have already remarked that the abnormalities are often exaggerations of some childish characteristics; for instance, all children are selfish, but normal children, as they grow older, gradually learn to give way to others, and to share their things with others.

In a few children there is the greatest possible difficulty in teaching them kindness and unselfishness, and they will fly into a passion, or have a morose fit, if they are not made the sole consideration. The tendency to untruthfulness or to the appropriation of other people's belongings is strikingly displayed in some children, and careful training does not enable them to realise that polite society cannot tolerate unblushing liars, or the pilfering of other people's goods. Such children are only too likely in time to reinforce the criminal class.

It must be apparent to every one that infants and children differ much from one another in their dispositions, temperaments and characters. These various dispositions are hereditary, but they can be combated or aggravated by the influences brought to bear in the nursery. It is not needful to point out that no pains should be spared by parents in studying these dispositions, and in thoroughly knowing the good and bad tendencies of their children.

A recent writer has remarked that 'a man labours for his children ten hours a day, gets his life insured for their support after his death, and yet he lets their mental growth, the formation of their characters, the evolution of their personality go on by absorption—if no worse—from common, vulgar, imported and changing, often immoral attendants. Plato has said the State should train the children, and added that the wisest man should rule the State. This is to say that the wisest man should tend the children.'[1]

During the last few years, what is known as 'child-study' has attracted considerable attention both in

[1] Baldwin, *loc. cit.* p. 365.

the United States and in this country, not only from psychologists and biologists, but also from educated parents and teachers. Systematic observations and records of the mental development of an infant are necessarily of value to the psychologist, but they cannot fail to be of value also to those who have to watch over the infant's health, and help to form its character. The mother who carefully observes and records the development and tendencies of her child will early detect any signs of disease, or any departure from normal development. She will gain a knowledge of the tendencies, dispositions, weaknesses, which must have an important bearing on its education and training.

With regard to the treatment of backward and exceptional children, I cannot go into much detail, but must content myself with making a few general remarks. The treatment necessarily largely consists in attempting to maintain the highest standard of health, and in the most intelligent and painstaking training. More than ordinary care must be exercised in providing, where it is possible, the most favourable life conditions. A dry soil, bracing climate, plenty of fresh air, an abundance of sunlight, exercise, well warmed and ventilated apartments are all important.

The diet must be generous and carefully regulated according to the child's power of digestion. Wherever it is possible a well-educated and highly-paid nurse or governess should be employed; it is important that she should have had previous experience in the care of backward or feeble-minded children, and been trained in kindergarten teaching. The greatest tact and forbearance is necessary, as well as firmness, in

training the child to habits of cleanliness and self-control.

In the teaching of backward children, the greatest stress must be laid on physical education. They can often be made to follow the movements of musical drill, including marching, and various exercises with their hands, legs, head and trunk. Various games must be organised, such as 'hide and seek,' catching coloured bags filled with beans, playing shop, selling and buying articles by means of imitation money. Their fingers are educated by folding papers, colouring pictures or designs with coloured chalks, building with bricks and playing with different kinds of kindergarten toys. Two matters must constantly be borne in mind: the lessons must be short and quickly changed, as children of this class cannot keep up their attention for long together; and also, backward children get on much faster if educated with others of the same status or children younger than themselves. They lose heart if they find their schoolmates are far superior in intellect to themselves, and are content to be always behindhand, and accept without effort the lowest place in the class. It often happens that a backward child wonderfully opens out when a baby brother or sister arrives and becomes a playfellow and classmate.

With children of abnormal dispositions and tendencies, also, everything depends upon discipline and training. They must be taught obedience and self-control from the very first; there must be as much physical exercise as possible, with a minimum amount of brainwork or excitement. It cannot be too carefully impressed upon parents that the children I have

referred to with highly excitable and unbalanced nervous systems, are only too likely to break down mentally before womanhood or manhood is reached; or they may suffer from hysteria in its worst forms, which is, as a matter of fact, closely allied to insanity.

The sooner these abnormal dispositions are recognised the better, and the more likely it is that they will be successfully combated or held in check. Wherever it is possible, the help of an experienced and trained nursery governess should be secured, and the child placed unreservedly in her hands. Kindergarten training should be undertaken early, so as to give the child plenty of interesting employment for expending its energies. That very real improvement takes place in the behaviour of the child when placed under suitable conditions of discipline and employment must be abundantly evident to anyone who sees much of children.

Children who make use of 'baby language,' misusing or slurring the difficult consonants, may be benefited by articulation lessons such as are used for teaching the deaf by the oral method. A careful study of the physiological alphabet must be made by the teacher, and the child taught to pronounce the consonant sounds by watching the teacher's lips, &c. (*See* Appendix.)

CHAPTER XVIII

GROWTH AND DEVELOPMENT IN EARLY LIFE

No one can see anything of ill health during early life without realising how much more important it is to prevent than to cure disease, and all who have the care of children will realise the advantage of timely notice of the approach of disease, and the value of danger signals. With this end in view frequent observations and careful records of the growth and development of a child, both as regards mind and body, are not only of interest but are of much importance in detecting in an early stage departures from normal health.

It frequently happens that a loss of weight or a failure to gain weight occurs before any definite symptom of disease appears. Timely warning may thus be given, and the cause of the loss of weight can be investigated by a competent authority. Periods of rapid growth are periods of danger, and children who are outgrowing their strength are very apt to suffer from alimentary disorders, headaches, nervous disturbances of various sorts; in fact, to show up prominently their 'seamy side.'

A weighing and measuring machine is a good investment for the nursery, and a record chart can

hang on the walls to afford a graphic record of gains and losses.

The question is frequently asked, 'How much ought my child to weigh?' or, 'How tall should he be?' Immediately there is resource to a table showing heights and weights at the various ages, and the mother is perhaps made proud or uneasy, as the case may be, at the result of the comparison. Now, while such tables are useful guides, it must be remembered that the figures are only *averages* made up of the heights and weights of the 'bigs,' the 'littles,' and the 'middlings' among a host of children. A child may be under-sized and yet perfectly healthy, while another may be tall and above the average weight and yet be anything but strong; in any case tables of averages should be read with 'brains.' The really important questions are, Does the weight bear a normal proportion to the height? Is the child gaining steadily, or is he losing weight?

It is only likely there will be ups and downs and variations in the weights both of infants and children, due to indigestion or slight indispositions of one sort or another, but often the cause of the loss is by no means apparent at first. In any case, when the increase in weight is not satisfactory, it is well to be on the look out for signs of ill health or of too great mental strain.

Heredity plays an important part in determining the rate of growth and development, just as it does in the formation of character, and in a hundred other ways it is a factor to be reckoned with in early life; but there can be no doubt, also, that growth and development are influenced by the child's surround-

ings, by the food it takes, the air it breathes, and the life it leads.

Weight.—The newly-born infant, if of average size, weighs between 7 and 8 lbs.; during the first few days there is often a loss of a few ounces, and then if the infant thrives, as it should, there is a steady gain in weight (*see* chart, p. 25) week by week. The period of most rapid increase is during the first two or three months. By the end of the fifth or sixth month the infant, if all has gone well with it, will have about doubled its birth-weight. It need hardly be said that no infant escapes some minor ills, and a very little digestive disturbance leaves its mark on the weight-chart. A losing or a stationary period points to something wrong either in the quantity or quality of its food, or there is indigestion of some sort. An excessive quantity of food is just as likely to be associated with loss of weight as too small a quantity. A disproportionate gain in weight is perhaps due to the infant becoming inordinately fat, and this is certainly not desirable. Breast-fed infants are much more likely to gain regularly week by week than artificially-fed infants. By the end of the first year the weight is usually 21 to 23 lbs., being about treble what it was at birth.

During the second year the gain in weight is much less, namely—8 or 9 lbs.; growth is less rapid now, and the child's life much more active than it has been. From 4 to 5 lbs. are usually added to the weight during the third year. During the fourth, fifth, sixth, and seventh years the increase in weight is about 4 lbs. per annum. The increase is somewhat greater after this for a few years; as from the

eighth to the eleventh year the gain is about 6 lbs. a year. During childhood, as in infancy, the weight-chart is almost certain to show some variations in the records.

Height.—The newly-born baby measures 19 to 20 ins. in length on an average, and grows some 9 ins. in length during the first year. During the second year the increase is about $3\frac{1}{2}$ ins., so that at two years of age the height is some 32 or 33 ins. if the child is healthy and well grown. During the third year and onward to the eleventh the increase is at the rate of from 3 to 2 ins. a year. At the eleventh or twelfth year there is frequently a spurt for two or three years, especially in girls.

At birth the legs are short as compared with the trunk, and during the first year there is active growth in the bones of the legs preparatory to their being used for locomotion.

The commonest cause of slow growth during the first two or three years of life is rickets; certain changes occur in the bones in this disease which give rise to a thickening of their ends, and a retardation of their growth in length. Children with defective brain development often grow slowly as well as being backward in the use of their limbs.

The rapidity of growth is much more often influenced by heredity than is the increase or decrease of weight, and is in consequence less significant as regards health. Slow growth may be traced to family characteristics rather than ill health in many cases.

It has been stated that the growth of children is influenced by the season of the year, and, like plant life, their growth is checked by winter's cold and

stimulated by the warmth of spring into abnormal activity. It has also been stated that children grow fastest during the autumn, but it is open to question if there is any solid foundation of fact in such statements. It is said with more show of reason that children grow abnormally fast when bedridden during a serious illness, but loss of flesh will give the appearance of increased height, and the flattening out of the natural curves of the spinal column by long lying in the horizontal position, will tend to increase the length of the body without actual growth having taken place.

It is certainly true that some children, mostly over six or seven years, who are by no means robust, grow abnormally fast, while at the same time there is not a corresponding increase in weight, or there may be an actual loss of flesh. There is, for some unknown cause, an abnormal activity in the growing centres near the ends of the long bones, especially of the legs, while their ends become enlarged as in rickets, the joints loose, and the muscles poorly nourished and flabby. There is an awkwardness of gait from loose knee- and ankle-joints; the arch of the foot gives way, forming flat feet. There is, perhaps, a tendency to round shoulders and curvature of the spine. In these cases new bone is rapidly formed, being formed faster than the system can supply material for growth; the bone is 'jerry-built,' and not perfectly well knit together as healthy bone should be.

Are there such things as growing-pains? Weakly rapid-growing children often complain of obscure aches and pains, and are liable to slight rises of

temperature towards evening when fagged and tired and irritable. Any such pains should be carefully investigated, though anything like making too great a fuss about small pains should not be encouraged, as such children are apt to be hypochondriacal. Are the pains rheumatic? Is there commencing disease of the hip and other joints? In the vast majority of cases when 'growing-pains' are complained of, the aches arise from overtired muscles or perhaps some slight injury or strain from which quickly growing children are very apt to suffer.

Head.—The careful observer will be certain to note that in the newly born the head and abdomen appear large in comparison with the chest and limbs. The weight of the brain bears a much higher proportion to the body weight in early infancy than it does in the adult. As time goes on the chest and limbs develop faster than the head, and the disproportion disappears. The circumference of the head in the newly-born is on an average some 14 ins. During the first year the brain grows and the skull enlarges, and its bony framework becomes firmer and stronger, so that at the end of the first year it measures about 18 ins. in circumference. During the second year the anterior fontanelle (*see* p. 130) gradually closes, and the head grows so that at the end of the second year it measures about 20 ins. Growth now becomes slower, as during the third and fourth years the increase is only about $\frac{1}{2}$ in. per annum, and it continues to grow at about the same rate, so that by the tenth year the child's head measures 21 or 22 ins. in circumference. In the adult 22 or 23 ins. is an average circumference, but the sizes of heads

vary, as everyone knows who tries on somebody else's hat.

In appraising the value of these averages it must be borne in mind that a small well-proportioned head in an undersized child is normal rather than abnormal. A small head much under the average and out of proportion to the face and body suggests some degree of mental deficiency. On the other hand, many backward and imbecile children have normal sized or even big heads. There is something in quality as well as quantity of brains! A large head with a prominent forehead is usually due to the thickened skull bones of rickets (*see* p. 130); a large round head suggests chronic hydrocephalus.

Chest.—The chest circumference, as measured with a tape on a level with the breasts, measures about 13 ins. in the newly-born infant, being thus smaller than the head. In the adult the chest circumference is about half as much again as the circumference of the head. During the first year there is a gain of about 6 ins.; during the second year the increase is much less, being rather more than an inch; and about the same during the third year, so that at three years it is about 21 ins., being now slightly larger than the head. The yearly increase is slower after the third year, so that at ten years of age the chest circumference is perhaps about 24 or 25 in.

In making these measurements it should be borne in mind that the measurement should be taken when the chest is at rest, neither after a full breath has been taken or after a forcible effort, the breath not being held in the position of deep inspiration or forced expiration. In children who are old enough to inspire

deeply and to hold their breath on being requested to do so, the measurements may usefully be taken in the positions of deep inspiration and forced expiration for the sake of comparison, especially if the child is having respiratory exercises.

The chest circumference of a fat infant or child will necessarily be larger than a thin one, though the actual chest capacity may be the same in both cases. Narrow and deformed chests are common in children who have suffered much from rickets, nasal obstruction, bronchitis, whooping-cough, and pleurisy.

If the chest is deformed or well below the average in circumference, exercises and gymnastics should be undertaken to develop it.

Muscular Development.—The development of the muscles ought to keep pace with the growth and consolidation of the bones. At birth the spine is very flexible, as the vertebræ are not entirely consolidated and the ligaments weak, but more especially because the muscles of the back which move the spinal column are as yet weak and toneless. During the first year, if all goes well with the infant, the vertebræ are consolidating by the formation of firm bone, while the muscles of the back and limbs are developing and coming more and more under the control of the brain. If development proceeds at a normal pace, the infant at three months of age holds up its head firmly when its back is supported, and at eight or nine months can sit up by itself on the floor. A month or two later it begins to use its limbs in crawling or in rolling about on the floor. At twelve months it very likely can stand alone, and a few months after can walk about without help. Ill health or mental deficiency will be

very likely to render the infant backward in the use of its muscles.

All through infancy and childhood the greatest freedom should be encouraged in the use of the muscles, and the clothing should be arranged so as to allow of the most complete liberty for muscular movements.

At first sitting up or walking throws too much strain on the weak back and limbs; the bones, ligaments, and muscles are as yet limp. If the infant sits up too long together the spine is almost sure to give to some extent, and can be seen to bow out more or less backwards, but straightens out again when it lies down; gradually the muscles become stronger, and the child sits up firmly. In the same way during the second and third years the muscles of the legs are not strong and the joints are loose. The child is not firm on its legs; it cannot jump or turn round quickly; it easily tires, and is apt to trip and fall. The knees tend to knock together in walking, especially when fatigued, and the feet tend to become flat by the giving way of the arch of the foot. Unless these slight deformities become marked there is no cause for uneasiness and splints or apparatus of any kind are not required, except, perhaps, in very extreme cases. What is wanted is to give the muscles reasonable exercise, but to avoid long walks or fatigue. Send the child out for an airing in a mail-cart, and let him get out and run about for short runs, then have a ride home in the mail-cart to ease his legs. I have already referred (p. 210) to rapidly growing children of seven or eight years and upwards who are apt to develop similar weaknesses. There is a spurt

in the growth, and a general limpness of body supervenes. The muscles are flabby; the girl or boy becomes round shouldered; there is a lateral curvature of the spine, causing one shoulder to be lower than the other. There is disinclination for exertion both mentally and physically. All this is common enough in slight degree, and requires extra care in the way of rest and country air. The worst class of case is, however, very troublesome, and, in spite of appropriate treatment, deformities are apt to ensue.

Hygienic Measures.—The most important factors in influencing growth and development are, suitable food, plenty of fresh air, and reasonable muscular exercise. With regard to diet, quantity is as important as quality. It is common enough to find a quickly-growing child, wretchedly thin and poorly developed in spite of the well-intentioned stuffing with food which is going on. The mother complains that the appetite is wretched, and no wonder, for food has been given at all hours and far in excess of the digestive powers. The digestive system has been overtaxed, and the stomach and tissues are loaded with by-products and waste-products, the results of imperfect digestion, and there is a failure of nutrition in consequence. A capricious or poor appetite is a sign of disordered digestive powers, and should be treated by starvation rather than by 'tasty' food, by resting the stomach than by still further overtaxing it.

Feeding before breakfast or between breakfast and dinner is a mistake in the vast majority of instances, and suppers, especially heavy suppers, are not to be commended. Fresh meat, poultry, fish, eggs, fresh vegetables, cooked fruit, may be given freely at meal

times. The heaviest meal is best taken in the middle of the day; water should be drunk, not milk, as the latter is far too heavy for most digestions at dinner-time.

Country air, the moors, the sea-side, will often work wonders in improving the appetite and the nutrition of the body, as well as bracing up weak spines and legs.

Muscular exercise short of fatigue is of the greatest value all through childhood in promoting the general health and the development of the muscles and limbs. Outdoor games of skill which require running and exercise of the body and limbs, if not too prolonged or violent, are to be strongly recommended. Physical exercises are means to the same end, and are useful in retaining the child's attention and practising control over the muscles. In such exercises all the muscles of the body are exercised in turn, avoiding excessive exercise of any group.

It is not possible to give here any details of the physical exercises, and for the most part a trained teacher is required; the exercises are better practised and are more interesting at a kindergarten school with other children than at home. Still, much may be done at home by an intelligent mother or governess.

Breathing exercises are among the most important exercises during early life. These are of especial value when there is any chronic obstruction in the nose, such as chronic catarrh or a thickened condition of the membrane lining the nose and throat. Under these circumstances the child tends to become a 'mouth breather,' and breathing through the nose is

largely relinquished. This tends still more to produce a congestion of the mucous membrane lining the nose and throat. When there is a narrow or deformed chest from any cause, breathing exercises are beneficial in expanding it. An extra supply of oxygen is introduced into the system, the capacity of the lungs is increased, and the circulation of blood through the brain and the membranes lining the nose accelerated.

In performing breathing exercises it is of importance that the child should breathe pure air, that the mouth should be kept shut, and the air made to pass entirely through the nose. The nose should be freed first from all mucus and attended to if necessary during the exercises. Some of the exercises may be taken lying down, and others standing with the hands on the hips. Successive deep inspirations should be taken, followed by forced expirations. These movements may be performed twelve times in succession. The breath should not be held, but the expiration should at once follow the inspiration. The exercises may be varied by taking short as well as deep inspirations, and also by raising the arms overhead during inspiration and lowering them during expiration. These exercises may be taken once a day, or in cases of much nasal obstruction twice a day, and continued for some months.

CHAPTER XIX

SUMMARY OF THE PROGRESS OF A CHILD DURING THE FIRST THREE YEARS, ARRANGED CHRONOLOGICALLY.

First month.—Sleeping and feeding are the sole occupations of the infant during the first few weeks of life; something like twenty hours out of the twenty-four are spent in sleep. It should sleep continuously from eleven at night till five in the morning. It is fed every two hours from 5 A.M. to 11 P.M. If the weather is suitable, it is taken every day into the open air. After the first week it gains weight at the rate of 5 or 6 ozs. weekly. During the first few weeks the infant is practically 'mind blind.' Impressions received by the sense organs as yet hardly affect the immature intellectual centres. Hunger or indigestion causes restlessness and whimpering, food and warmth tend to produce sleep. All the muscles of the body are limp and soft. The infant cannot hold up its head or alter its position; when in its cot it remains helpless in the position in which it is placed, and is, in consequence, easily suffocated under the bedclothes.

Second month.—During the second month, the infant gives evidence of being hungry every two or

three hours during the day, but should sleep at least six hours at a stretch between 11 P.M. and 5 A.M. Infants, however, differ very much in this respect, and, especially when not digesting their food well, are apt to be wakeful and peevish. It should be gaining weight at the rate of 5 to 6 ozs. a week. It is taken out into the open air twice a day in its carriage, when the weather permits. It is beginning to show signs of mind-awakening, as it sleeps less, and its face wears a brighter aspect. It begins to take notice of brightly coloured objects, following a lighted candle or brightly coloured ribbons with its eyes, and is attracted by musical notes. It will turn its head in the direction of its mother's voice, and by the end of the month smile at the sight of her face. Its cry becomes more expressive, the whining cry of discomfort or hunger being distinguishable from the sharper cry of pain as from indigestion. When it is contented and happy, as when satisfied by a meal, it will crow and babble to itself. Preyer thought he could distinguish in the 'baby-twitterings' of his own infants at this period such sounds as *am-ma, ara ta-hu*, but it is needless to say that such sounds are quite meaningless.

Third month.—During the third month, the infant requires to be fed every two and a half or three hours, but should sleep soundly most of the night. It is still gaining weight at the rate of 5 or 6 ozs. a week, and at the end of the month will weigh perhaps 12 lbs., assuming that it was of an average weight at birth. It is much less drowsy than when a week or two old, and will lie awake in its cot crowing or taking notice of what is going on in the

room. It has much more command over its limbs, for it will kick vigorously when lying on a mattress by itself, or it will smile and give little jumps to try and make its mother or nurse take it up and talk and play with it. The hands will grasp objects, which are carried at once to its mouth. It is nothing like as limp and helpless as it was, and its back and head no longer want much support when it is carried about. By the thirteenth week a healthy infant will usually be able to hold its head up if the back is supported. By this time the infant will probably have shown more or less evidence of temper ; perhaps its milk doesn't come fast enough, or the food in its bottle is too warm or not sweet enough ; it will stiffen its back and limbs, draw in and hold its breath, and then burst into an impatient cry. Its crowing is more varied, and more consonant and vowel sounds may be heard. During this month, some progress ought to have been made in teaching the infant regular habits with regard to the emptying of the bladder and bowels. If held out at regular times before going to sleep, both at night and in the day-time, many wetted napkins and damp clothes will be saved.

Fourth month.—During the fourth month, the infant is still gaining weight at the rate of about 5 ozs. a week, and by the end of this month an average infant will weigh some 13 lbs. 9 ozs. It should be taking some 5 ozs. of food every two and a half to three hours during the day, and should sleep all the night. It can hold its head up fairly well now if the nurse supports the back. It can hardly sit up by itself yet, but can do so if more or less supported in a

chair or by the nurse. It will now seize things, such as toys, with its hands and throw them on the floor. Displays of temper are far from uncommon ; it throws itself back, stiffens its limbs and bursts into a loud cry ; however, it is easily appeased and a fit of laughter perhaps quickly follows. By the fourth month, infants can distinguish a stranger's face from that of the nurse, and will perhaps cry if the stranger takes them ; at the appearance of a stranger they will perhaps show signs of astonishment, will open their eyes and mouth wide, raise the hands and spread out the fingers.

Fifth and sixth months.—During these months the infant sleeps through the whole night—at least it should do—for ten hours at least. During the day it takes some 6 to 8 ozs. of food every three hours. It has a morning and an afternoon sleep, and if the weather is suitable it spends several hours in the carriage in the open air. During its waking hours it is lively enough ; it will sit up in a high chair, and take a delight in a rattle, or in knocking a spoon against a plate. Any sort of racket that it can produce itself is a source of the greatest delight. When in its happiest mood, it will babble and crow, varying its tone, but no words that can be distinguished are spoken. It can vary its cry, too, to express anger, impatience, or disappointment. It can understand a good deal of what is said to it, and will recognise that the word 'pussy' is meant for the cat, 'nana' for its nurse, and 'tick-tack' for the clock. It spends nearly the whole of the waking hours in looking about it and noticing what is going on. By this time the infant can readily read the facial

expression of its nurse and mother. It understands when they are pleased and recognises when they are cross or vexed. A healthy well-trained infant of six months rarely wets its napkin if its wants are anticipated. There is a constant escape of saliva from the mouth, in consequence of the free secretion of saliva and the infant's inability to retain it in its mouth.

Sixth to the ninth months.—During the third quarter of the first year, the infant is taking some 40 ozs. of food per diem, which, if it is bottle fed, consists of cow's milk thickened with oatmeal or other cereal. It is not gaining weight now as fast as it was in the early months ; 4 to 5 ozs. a week is a common average at this time. It should sleep all night and have a morning and afternoon sleep during the day. It sits up to the table now and plays with toys, but too long sitting up must not be allowed, as the back is not strong yet. It may lie on a mattress on the floor and kick about as much as it likes. It is during the seventh month that the first tooth—usually one of the lower incisors—is cut, to be followed shortly by the second. The infant at this period, though unable to speak a single word, learns the names of various familiar persons or things, and will point them out or turn towards them if asked to do so.

It will laugh loudly if tickled or played with, but it is not wise to excite it too much. At this time it will give evidence of fear and will shrink away from a strange animal. It expresses pleasure by babbling and cooing. According to Baldwin, the infant shows a decided tendency to righthandedness by the seventh or eighth month.

Tenth to the twelfth months.—During the last quarter of the first year, the healthy infant is taking 40 to 50 ozs. of milk daily, which may be thickened with barley or oatmeal. Five meals a day is the right number. It is gaining weight at the rate of some 4 ozs. weekly, and by the end of the first year weighs on an average 22 to 23 lbs., having practically trebled its weight since birth. Heavy babies are not always strong babies; they may be very fat and consequently heavy, yet their blood may be poor, and their bones soft. By the tenth month the infant should sit up quite strongly by himself, without any assistance, either on the floor or in his bath. He may be allowed to sit up now on the floor and play with his toys. The four upper incisor teeth are usually cut during the last quarter of the first year. If care has been taken to attend to the baby's wants, the napkin may now be discarded, though accidents will still occasionally occur. It is a great advantage to get rid of the napkin, and moreover it is difficult to keep in its place after the baby has begun to crawl about. By the tenth or eleventh month the infant is usually creeping about the floor, and before long is able to stand by the help of a chair. He will crawl, perhaps across the nursery floor, to something that attracts his attention, and then pull himself up by means of his hands grasping some fixed support. By the eleventh month the infant will often stand by himself without support, but he is at first not too sure of himself and will only too likely flop down if he attempts to walk. If helped so as to be sure of his balance he will move his legs as in walking. By this time various imitative movements have been acquired; he will clap hands and

play at 'batter-cake, batter-cake, baker's man, &c.'; shake his hand as in saying *tata*; and such instinctive movements as biting, licking, grinding the teeth, are now noted. He has mastered several words at least, though it is by no means certain that he clearly understands their meaning or applies them properly. We often have *baba*, *tata*, *dada*, *mama*, *nana*. He knows, too, his own name, for he will look and smile when he is called by name. We see that by the end of the first year the baby can neither speak nor walk, but he has made a beginning in the use of his legs for walking, he can repeat a few words parrot-like, and can understand a good deal of what is said.

First quarter of the second year.—By the beginning of the second year most children are able to creep; they can sit up cross-legged on the floor and shuffle along sideways; but when they want to go from place to place, they turn over on to all fours and creep across the room till perhaps they reach a chair, and then pull themselves up into an upright position. This goes on for a variable period, but usually by the fifteenth month they can get along in the upright position for a short space.

Progress is being made in the meantime in learning to talk; the child will nod his head for 'Yes,' and shake his head for 'No.' He knows the names of many common objects, and will point them out when asked to do so. His vocabulary of spoken words is as yet very spare. He is pleased with the tick of a watch, and will want to appropriate anything that he sees and which takes his fancy. The feeding bottle is now gradually dispensed with, the infant learning to drink out of a spoon or cup. He sleeps

all the night, and has a good nap of two hours in the middle of the day. Toys are a great delight, but very little care is taken of them.

Second quarter of the second year.—During the fifteenth or sixteenth month, the healthy child has usually fairly mastered the art of walking. At first two-legged progression has to be proceeded with very carefully; stumbling is common enough over obstacles, and equilibrium easily upset; chairs, tables, or any other solid bodies, are clutched in order to assist. Perhaps after walking a few steps the child plumps down, and finishes his journey on all fours. A good deal of progress is being made in understanding spoken language, but he does not yet say much or have a very large vocabulary. He has learned to mimic sounds, as the sound produced by puffing at a pipe. He will blow out a candle, or blow on the case of his father's watch to see if it will fly open. He sits up to the table for meals, holds a crust of bread in his hands and gnaws at it, and will even carry a spoon to his mouth, but he cannot be trusted to feed himself yet.

Eighteen months to two years.—By eighteen months the child is usually fairly at home on his feet; he can trot about the house now without much fear of falling, or he can find his way about in the garden, and a little later will run away to escape being caught. He is easily tired, and must not be allowed to be too much on his legs. He sits up to the nursery table for meals, and can feed himself with a spoon, but is not very skilful in its use. His understanding of words said to him is increasing; he answers by nodding his head for 'Yes,' or shaking it for 'No'; he will shake his

hand and say *tata*, and during the succeeding months his vocabulary of spoken words of which he knows the meaning is increasing fast. He says *ta* for thank you, *poo* for pussy, *ba* for ball. By the twentieth or twenty-second month not only will there be a much enlarged vocabulary, but the child will begin to put two or three words together, as *more milk*, *big bir(d)*.'

During the last half of the second year, the child usually is able to recognise the common animals as depicted in his picture books. At first all animals are perhaps *gee-gee*, or *bow-wow*, or *ba-ba*, but as time goes on he learns the difference. Colour, too, he is beginning to distinguish, but he certainly has not a fine discrimination at first. All men for awhile are *papa*, but about this time he appears to apply the word to his father only ; he begins to understand the meaning of *naughty* and *good*, and applies these terms to his nurses, brothers, animals, dolls, &c.

Third year.—The progress in speech is now very rapid and his pronunciation of words much clearer than at first, though slurring, and the substitution of easy for difficult consonants, constantly occur. Sentences including nouns, verbs, adjectives, &c., are mastered. Picture books give endless amusement and are in constant request ; most common objects—dogs, horses, birds, cats and kittens, children, &c.—are recognised at once. The child at the beginning of the year uses his own pet name in speaking of himself and his wants ; towards the middle of the third year, 'me' or 'I' is substituted. He has as yet no

notion of numbers or of time. By the middle or end of the third year, the child usually recognises the primary colours, such as red, blue, yellow, &c., fairly well; and begins to recognise persons, places, circumstances, &c., after the lapse of a few months, and, indeed, he may retain impressions formed at this time for the rest of his life. Sully relates how his boy, at two years and two months, made friends with a sheep dog named 'Bob' when staying at a farm; three and a half months after leaving, he saw another sheep dog and said, 'Dat old Bob, I dink.' Three years and a half after he still remembered persons he met and circumstances which took place when staying at the farm. The celebrated Helen Keller, who became completely blind and deaf from illness when nineteen months old, can recall hearing the singing of birds, and seeing green leaves, flowers, &c., in the garden at her home.

Towards the end of the third year, the age of questioning begins; the names of things are asked, and many puzzling questions are put; the child becomes more and more courageous in his behaviour to animals. He is much more active in running about and can get upstairs by himself. During the third year the child will often make some more or less successful attempts to draw with a pencil on a slate or paper. For a long time the attempts are simply making marks up and down the paper, and the fact that a pencil leaves a mark is quite enough to attract attention. Later on more or less curved lines or circles are attempted, and then perhaps a circle and straight lines to represent the figure of man, provided

a copy has been set. But the difficulty of getting the child's attention prevents any marked advance. It is now that attending a kindergarten school or being given elementary kindergarten employment in the nursery begins to be of especial value. But a trained teacher is of course required.[1]

Books which may be consulted.

'Children's Ways,' by Prof. J. Sully. Longmans & Co.

'Mental Development in the Child and the Race,' Prof. Mark. Baldwin. Macmillan.

'Mental Development in the Child,' Prof. W. Preyer. Ed. Arnold.

'A Study of a Child,' Louise E. Hogan. Harper Brothers.

'Physical Education,' Lennox and Sturrock. Blackwood & Son.

'The Practical Nursing of Infants and Children,' Dr. F. C. Madden. Cassell & Co.

[1] Training colleges for children's nurses: Princess Christian Training College for Children's Nurses, Kersal, Manchester; The Norland Institute, Holland Park Avenue, London, W.

APPENDIX

Chapter II., Page 15.

The **Cots** used in the Manchester Children's Hospital are made of enamelled iron, and are arranged so that both sides let down. They are mounted on india-rubber castors, and provided with woven wire steel mattresses ; over this is a horsehair mattress. They are made by the Longford Wire Co., Limited, Warrington.

Weighing machines for infants can be obtained of T. Hawksley, 357 Oxford Street, London, W. The Victoria combination scales, made by the Howe Co., of New York, may be obtained of the Walker-Gordon Co., 5A Duke Street, Grosvenor Square, W.

Weight charts can be obtained of T. Hawksley, 357 Oxford Street, W.

The Normonic suspension baby-walker is made by A. Smith, 40 Hill Street, Arbroath, N.B.

Chapter III., Page 29.

Boric acid solution (saturated) may be obtained from a chemist and warmed for use. **Weak Condy's fluid** may be made by diluting Condy's fluid (1 per cent.) twenty to thirty drops in a tumbler of warm water.

Graduated pipettes.—Mottershead & Co., Exchange Street, Manchester.

Infant incubators can be obtained of Charles Hearson & Co., Limited, 235 Regent Street, London, W.

Chapter V., Page 43.

Infant's hygienic clothes.—Patterns can be obtained from the Lady Superintendent, Princess Christian Cottage, Withington, Manchester.

Napkins.—Ready made up of absorbent material are made by Southall Bros. & Barclay, Birmingham, under the name of 'Knapkinettes.' They are made in three sizes.

Shetland wool vests, &c.—Anderson, Commercial Street, Lerwick, N.B.; John White, 10 Frederick Street, Edinburgh.

Hygienic boots and shoes.—Holden Bros., 223½ Regent Street, W.; Cooke & Townsend, Liverpool; Dowie & Marshall, 445 West Strand, London.

Chapter VI., Page 56.

Mouth wash.—Condy's fluid (1 per cent. solution), twenty to thirty drops in a tumbler of water. Or 'Euthymol' diluted two or three times with water.

Tooth powder.—Precipitated chalk, 4 oz.; curd soap in powder, ½ oz.; carbolic acid, 20 drops; otto of roses, 5 drops (Pedley).

Chapter VIII., Page 80.

Milk preparations.—Welford & Sons, Limited, Elgin Avenue, Maida Vale, London, W.

Modified milk.—The Walker-Gordon Co., 5A Duke Street, Grosvenor Square, W., furnish a modified fresh cow's milk for infant feeding. The milk is modified according to the prescription of the medical man in attendance on the case. The prescription states the percentage of fat, proteids, sugar, &c., the food should contain in order to suit the age

or digestion of the infant. This modified milk is sent out in bottles, ready pasteurised, and in hot weather packed in ice. Cream of a definite strength and other milk preparations are sent out by this firm.

Barley water.—The most ready way of making barley water is to use prepared barley meal, such as Robinson's prepared barley, taking one tablespoonful to a pint of water, and simmering gently for 15 or 20 minutes. If the grains of pearl barley are used, wash them well and allow to soak over night; throw away the water and add fresh clean water at the rate of two tablespoonfuls of barley to the quart of water; simmer gently for three hours, make up to a quart by adding fresh water. Strain.

Oatmeal water, Rice water.—These may be made in the same way as barley water by substituting prepared oatmeal flour or ground rice, mixing in the same proportion. These foods consist of thin starchy fluids, which are useful for diluting milk, and are more appropriate after the infant is six months of age than before. During the first few months infants are unable to digest starch, except in the smallest quantities. Rice water and barley water are useful when the bowels are loose, oatmeal water when there is a tendency to constipation.

Lime water is of value to add to the infant's food in order to render it slightly alkaline, as all foods prepared from cow's milk are apt to be slightly acid. One-twelfth part is usually sufficient for the purpose. There is no advantage in adding more as a rule, but in some cases of vomiting one-sixth part may be added, as the lime water acts as a sedative on the stomach. Lime water can be prepared by placing two ounces of pure hydrated lime in a stoppered 'Winchester quart' bottle, then filling up with pure clean water; shake well, and allow to stand. Use the upper clear portion.

Chapter IX., Page 97.

Milk sterilisers. — Obtained from T. Hawksley, 357 Oxford Street, London, W. Mottershead & Co., Exchange Street, Manchester.

Condensed milk.—*Unsweetened* condensed milk, Ideal milk, supplied by the Anglo-Swiss Condensed Milk Co., New York; also Viking Brand, The Norwegian Condensed Milk Co., Christiania. *Sweetened* condensed milk, Milkmaid Brand, Anglo-Swiss Condensed Milk Co.

Whey.—As already remarked, whey is a valuable food for infants with weak digestion. It can be used with advantage for diluting milk, or cream may be added to it. It can be readily made by warming a pint of milk to 100°, adding a teaspoonful or two of Benger's artificial rennet; in a few minutes the curd will separate from the whey: break up the curd well with a fork, and strain through a fine wire sieve or colander. One pint of milk will make about fifteen ounces of whey. The whey must be scalded or heated to 170° F. to destroy the rennet, and cooled.

Chapter X., Page 104.

Raw beef juice.—This is best prepared from Dr. Cheadle's formula. Mince finely the best rump steak, then add cold water in the proportion of one part water to four of meat. They should be well stirred together, and allowed to stand for half an hour in the cold. Strain through muslin, forcibly expressing all the juice possible from the meat by twisting the muslin. Mutton or chicken may be substituted for beef. Some children will take the beef juice better if some white sugar be added to the water and minced beef before straining. Freshly made beef juice is of much higher nutritive value than any of the preserved meat juices, and should always be used in preference. Some prefer to use mutton instead of beef, inasmuch as sheep rarely suffer from tuberculosis.

Beef tea.—Beef tea is much less nutritive than raw beef juice, but it is very useful as a refresher and stimulant. Cut up a pound of best fresh beef steak, freed from fat, into fine pieces, add a pint of cold water, and allow it to stand for an hour. Place in a jar ; the jar is placed in a saucepan and surrounded with water, which is allowed to boil gently for an hour. Add enough water to the beef tea to make up for the loss by evaporation. Add salt as required. Mutton, veal, or chicken may be substituted for the beef.

Scraped beef.—Take a thick rump steak of the best quality, scrape it with a knife until reduced to shreds. The scraped meat can be served up in beef tea, or made into sandwiches with thin bread and butter. Scraped meat can be made, if preferred, from the juicy inside meat of a quickly broiled beef steak, removing the burnt surface first.

Chapter XI., Page 112.

Enemas.—Glycerine enemas are useful in constipation ; half a teaspoonful or a teaspoonful of glycerine may be used. A special syringe for the glycerine with a curved ebonite nozzle is required.

Enemas are often used to destroy thread-worms which infest the lower part of the bowel. An aperient medicine is first given to clear the bowels, and when this has thoroughly acted, an enema of half a pint to a pint of common salt in warm water is slowly injected by means of a Higginson's syringe. A tablespoonful of salt to the half-pint will be enough. It may be necessary to repeat the enema several times on alternate nights.

Glycerine suppositories. — 'Enules' made by Burroughs, Wellcome & Co.

Chapter XII., Page 129.

Hot fomentations.—Speaking generally, linseed poultices are to be avoided during early life ; when a damp heat

is required, it is best applied by placing a piece of spongiopiline in nearly boiling water, wringing out in the folds of a towel, letting it cool till it can be borne on one's own cheek, applying to the chest or abdomen, and keeping in place by tapes or bandage.

Bran bag.—The bran bag is a useful way of applying heat; a flannel bag is filled with bran, it is saturated with boiling water, wrung out in a towel, placed against the nurse's cheek to test the temperature, and applied. It is especially useful over the abdomen in colic.

Means of reducing feverishness. *Sponging.*—The readiest means of reducing fever—and one which is quite safe to use—is by sponging. The child should be stripped, and lie on a blanket with a waterproof sheet beneath; a large sponge should be used, and the head, trunk, and limbs be sponged alternately. Begin with tepid water, and gradually substitute cold water. *Packs.*—Packs are useful in reducing temperature by producing perspiration. A sheet should be wrung out of cold water, and applied to the child from neck to feet; a blanket is then wrapped round. Waterproof should not be used round the patient—as is sometimes done—but some porous material like blankets to absorb the perspiration. The packs may be re-applied every fifteen minutes; but if the child is comfortable and goes to sleep, it need not be disturbed.

Carbolic ointment. — Ten per cent. carbolic acid in vaseline or lanoline ointment. May be used on the scalp, body, or limbs, but not to the face, or if the skin is broken.

Sulphur ointment.—Precipitated sulphur 15 grains; camphor, 15 grains; boric acid, 20 grains; petroleum ointment, 1 ounce.

Table of Average Heights and Weights from Birth to Fourteen Years (Rotch)

Boys		Age	Girls	
Height	Weight		Height	Weight
Inches	lbs.		Inches	lbs.
19·75	7·15	Birth	19·25	6·93
24·75	14·30	5 months	23·25	13·86
29·53	20·98	1 year	29·67	19·8
33·82	30·36	2 years	32·94	29·28
37·06	34·98	3 ,,	36·31	33·15
39·31	37·99	4 ,,	38·80	36·36
41·57	41	5 ,,	41·29	39·57
43·75	45·07	6 ,,	43·35	43·18
45·74	48·97	7 ,,	45·52	47·30
47·76	53·81	8 ,,	47·58	51·56
49·69	59	9 ,,	49·37	57
51·68	65·16	10 ,,	51·34	62·23
53·33	70·04	11 ,,	53·42	68·7
55·11	76·75	12 ,,	55·88	78·16
57·21	84·67	13 ,,	58·16	88·46
59·88	94·49	14 ,,	59·94	98·23

N.B.—The weights during the first three years are without clothes; after third year in ordinary in-door clothes. The height is measured without boots or shoes.

Table showing Average Circumference of Head and Chest during Infancy and Childhood

Age	Head	Chest
	Inches	Inches
Birth	14	13
Six months . . .	$16\frac{1}{2}$	17
Twelve months . .	18	19
Two years . . .	20	$20\frac{1}{8}$
Three ,, . . .	$20\frac{1}{2}$	$21\frac{1}{4}$
Four ,, . . .	21	$21\frac{1}{2}$
Five ,, . . .	21	$21\frac{1}{2}$
Six ,, . . .	21	$21\frac{3}{4}$
Seven ,, . . .	$21\frac{1}{4}$	$22\frac{1}{2}$
Eight ,, . . .	$21\frac{1}{4}$	$23\frac{1}{2}$
Nine ,, . . .	$21\frac{1}{4}$	$24\frac{1}{4}$
Ten ,, . . .	$21\frac{1}{2}$	$24\frac{1}{2}$

A PHYSIOLOGICAL ALPHABET (Wyllie)

I.—Vowels

y—i e a o u—w

These should be pronounced in the Latin manner, as *ēē*, *eh*, *ah*, *oh*, *ōō*. *y* and *w* are consonants, not vowels, but they have very close relationship to the vowels, initial *y* being very closely related to *i*, and initial *w* to *u*.

II.—Consonants

—	Voiceless Oral Consonants	Voiced Oral Consonants	Voiced Nasal Resonants
Labials (1st Stop Position)	*P* (W)	*B* W	M
Labio-Dentals	F	V	
Linguo-Dentals	Th S	Th Z	
Anterior Linguo-Palatals (2nd Stop Position)	Sh *T* (L)	Zh *D* L R	N
Posterior Linguo-Palatals (3rd Stop Position)	*K* H or Ch	*G* Y (R)	Ng

The voiceless *W* and the voiceless *L* have been given above within brackets, the former being now almost confined to Scotland, and the latter being peculiar to Wales. The burring or uvular *R* is also given within brackets.

ILLUSTRATIVE SENTENCES

I.—Vowels

Eels ail amid ocean ooze.

This sentence represents only long vowels. Their short equivalents can be represented, as shown by Mr. Pitman, by attaching the letter *t* to each vowel, thus:

ĕĕt, *it*, *et*, *at*, *ut*, *ot*, *ŏŏt*

II.—Consonants

—
Peter Brown made white wax.
Fine Villages.
Thinkest thou so, zealot?
She leisurely took down nine large roses.
Can Gilbert bring Loch Hourn youths.

VOWELS

Wyllie points out that the vowels are best arranged in the order of gradual transition, from the narrowest and tightest shape of the resonating chamber, that is *ēē*, on to the largest shape, that is *ōō*. The order thus becomes i e a o u (*ēē*, *eh*, *ah*, *oh*, *oo*). The English *i* is really *ai*, and the English *u* is *yu*.

CONSONANTS

The horizontal columns represent the groups of consonants according to the position in the mouth in which they are produced, the three most important being the three stop positions :

1st Stop Position (Labials).—The stop is produced by the lips. The voiceless *P* is produced by closing the lips and then bursting them open by air compressed in the cavity of the mouth. *B* is produced in the same way, with the addition of voice produced by the vocal cords ; *M* by closing the lips, sounding the voice as in *B*, but letting the air escape through the nose ; *W* as in *wax*, by making an *oo* sound, partially closing the lips and letting the air escape through the opening.

2nd Stop Position (Anterior Linguo-Palatals).—The stop is effected by placing the tip of the tongue in contact with the anterior part of the roof of the mouth ; *T*, *D* and *N* are produced in a similar way to *P*, *B*, *M*. *Sh*, as in *she*, is produced by the stop being incomplete, air being allowed to pass ; *Zh*, as in *treasure*, in the same way, but with the help of the voice. *R* is produced partly by the voice, partly by the air passing over the vibrating tip of the tongue in the 2nd Stop Position ; *L* partly by voice, partly by the air passing over the sides of the tongue in this position.

3rd Stop Position (Posterior Linguo-Palatals).—The stop is effected by applying the upper surface of the back of the tongue to the roof of the mouth. *K*, *G*, *Ng* are pro-

duced like *P*, *B*, *M*, only in this position ; *H* by incomplete closure of the stop, and *Y* in the same way aided by voice.

Labio-Dentals.—*F* and *V* are produced by the passage of air between the upper teeth and lower lip, the one being voiceless, the other being voiced.

Linguo-Dentals.—The tip of the tongue in contact with the upper teeth allows of the production of the voiceless *Th*, as in *thin*, and the voiced, as in *thine* ; and applied to the roof of the palate behind the teeth, allowing of the production of the voiceless *S* and its voiced equivalent *Z*.

In the three vertical columns, the first contains the voiceless consonants *P*, *F*, *T*, &c., the sound being produced in the cavity of the mouth only. In the second and third the consonants are produced by the help of voice supplied by the larynx. In the nasal resonants the mouth is closed, the voice passing through the nose.

In the Physiological Alphabet, *c* is represented by *s* or *k* , *q* is of no value by itself, *qu* is equivalent to *kw* ; *x* is equivalent to *ks* ; soft *g* and *j* equal *dzh* ; soft *ch* equals *tsh*.[1]

Weights and Measures.

A tea-spoon contains one fluid drachm, a dessert-spoon two fluid drachms, a table-spoon four fluid drachms or half a fluid ounce, a wine-glass about two fluid ounces.

Fluid Measure.

60 minims	=	1 fluid drachm	(℥i).
8 fluid drachms	=	1 fluid ounce	(℥i).
20 fluid ounces	=	1 pint	(Oi).

Solid Measure.

20 grains	=	1 scruple	(℈i).
60 grains	=	1 drachm	(℥i).
8 drachms	=	1 ounce	(℥i).

[1] See *The Disorders of Speech*, by John Wyllie, M.D.

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